U.S. DEPARTMENT OF COMMERCE
National Technical Information Service

PB-263 593

Air Pollution Abstracts. Vol. 1, Number 9, Supplement 1 (Reissue of Vol. 1, Number 1, with Subject and Author Indexes). Abstracts 3565-4548. (NAPCA Abstract Bulletin)

Air Pollution Technical Info. Ctr., Research Triangle Park, N.C.

1970

PB 263 593

Volume 1, No. 9, Supplement 1
(Reissue of Volume 1, No. 1 with
subject and author indexes)
Abstracts 3565 - 4548

NAPCA

Abstract Bulletin

REPRODUCED BY
NATIONAL TECHNICAL
INFORMATION SERVICE
U. S. DEPARTMENT OF COMMERCE
SPRINGFIELD, VA. 22161

U. S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
Public Health Service
Environmental Health Service

TECHNICAL REPORT DATA
(Please read Instructions on the reverse before completing)

1. REPORT NO.	2.	3. RECIPIENT'S ACCESSION NO.
APABCA-1(1)-1970		

4. TITLE AND SUBTITLE	5. REPORT DATE
Air Pollution Abstracts Volume 1, No. 1	1970
	6. PERFORMING ORGANIZATION CODE

7. AUTHOR(S)	8. PERFORMING ORGANIZATION REPORT NO.

9. PERFORMING ORGANIZATION NAME AND ADDRESS	10. PROGRAM ELEMENT NO.
Air Pollution Technical Information Center Research Triangle Park, North Carolina 27711	11. CONTRACT/GRANT NO.

12. SPONSORING AGENCY NAME AND ADDRESS	13. TYPE OF REPORT AND PERIOD COVERED
Same	14. SPONSORING AGENCY CODE

15. SUPPLEMENTARY NOTES
Reissue, as Volume 1, No. 9, Supplement 1.
Spine bears the title.

16. ABSTRACT

This periodical is published to inform air pollution personnel of the Environmental Protection Agency (EPA), and others, of technical literature recently accessioned by the Air Pollution Technical Information Center (APTIC). For each accession, its Abstract Number, APTIC accession number, bibliographic citation, and abstract are given. Translations are cited with their sources whenever possible. The subject fields are as follow: Emission Sources; Control Methods; Measurement Methods; Air Quality Measurements; Atmospheric Interactions; Basic Science and Technology; Effects-Human Health; Effects-Plants and Livestock; Effects-Materials; Economic Aspects; Standards and Criteria; Legal and Administrative; Social Aspects; and General and Miscellaneous. All abstracts are listed under one of the above subject fields. A subject and author index are included. This issue contains abstracts 3565 - 4548.

17. KEY WORDS AND DOCUMENT ANALYSIS

a. DESCRIPTORS	b. IDENTIFIERS/OPEN ENDED TERMS	c. COSATI Field/Group
Air pollution Abstracts Information retrieval		13B 5B

18. DISTRIBUTION STATEMENT	19. SECURITY CLASS *(This Report)*	21. NO. OF PAGES
Unlimited		256
	20. SECURITY CLASS *(This page)*	22. PRICE
		9.00 - 3.00

EPA Form 2220-1 (9-73)

NAPCA ABSTRACT BULLETIN

Prepared and Distributed by:

Office of Technical Information and Publications (OTIP)
Air Pollution Technical Information Center (APTIC)
National Air Pollution Control Administration (NAPCA)
Research Triangle Park
Raleigh, North Carolina 27709

The purpose of this bulletin is to inform NAPCA personnel and others of technical literature recently accessioned by APTIC. For each accession, the NAPCA Abstract Bulletin number (NAB), the APTIC number, a bibliographic citation, and an abstract are given.

This is a reissue, therefore care should be taken to prevent duplication of previous requests.

NAPCA personnel should direct requests for full text duplicates (if not locally available) to APTIC citing the APTIC numbers desired. Translations of foreign language documents may be arranged upon request for NAPCA personnel only.

Non-NAPCA readers may, of course, obtain duplicates of documents either from local libraries, from publishers, or from authors. For non-NAPCA personnel APTIC may not provide duplicates of any document, the sole exception being NAPCA- or PHS-generated report literature. Non-NAPCA readers may obtain this material, until supplies are exhausted by sending the full citations desired to the address shown above.

Citations of documents available for purchase from either Superintendent of Documents, Government Printing Office, Washington, D. C., or from Clearinghouse for Federal Scientific and Technical Information, U. S. Department of Commerce, 5285 Port Royal Road, Springfield, Virginia 22151, are designated as GPO, or CFSTI, respectively. Most Clearinghouse documents are sold for three dollars in paper copy and sixty-five cents in microfiche. Registered users of the Defense Documentation Center (DDC) may obtain microfiche of documents in the "AD" series without charge from: Defense Documentation Center, Cameron Station, Alexandria, Virginia 22314.

As another service, abstracts of all the literature in APTIC (not just in a single issue of the NAPCA Abstract Bulletin) on any subject related to air pollution will be provided free of charge upon request. APTIC can search information more recent than that in the current issue of the NAPCA Abstract Bulletin because of the lapse time entailed by editorial, make-up, and printing work. For those who wish to browse through their own copies of each NAPCA Abstract Bulletin in a short period of time, an author index and a subject index are included in each issue.

U. S. Department of Health, Education, and Welfare
Public Health Service
Environmental Health Service

TABLE OF CONTENTS

Scope notes for each category are given as a guide to our readers.

page

EMISSION SOURCES

Information pertaining to an industry, process, or material associated with air pollution. Documents in this category are concerned primarily with characteristics of a specific class of emission sources including types, rates, industries; secondary coverage may include effects, control methods, etc. 1

CONTROL METHODS

Includes equipment and both specific source control and general abatement efforts. Included are documents describing the operating principles, design, operation, efficiency, etc., of equipment and methods of removing pollutants from the air. The scope of the document can vary from a device for a specific source to an approach applicable to an entire industry--e.g., automobiles. 19

MEASUREMENT METHODS

Includes equipment as well as methods. Confined to development, testing and evaluation of pollutant determination methods (sampling, analytical, monitoring) and equipment, as such. Data obtained by use of methods in specific applications are placed in the applicable subject categories. 65

AIR QUALITY MEASUREMENTS

Pollution measurements in the ambient air, generally related to specific geographical locations, such as area surveys. Also includes general reviews of area situations and emission source inventories. 83

page

ATMOSPHERIC INTERACTION

All chemical and physical phenomena occurring in the atmosphere. Included is material on dispersion, air pollution forecasts, meteorological effects, topographical effects, photochemical reactions in the atmosphere, etc. Laboratory studies of photochemical reactions fall under Basic Sciences and Technologies. 87

BASIC SCIENCE AND TECHNOLOGY

General discussions or data compilations for the basic physical and chemical properties of pollutants. Theoretical and laboratory studies on related chemical and biological reactions and mechanisms. Mass transfer and other basic knowledge related to process engineering applications in emission control or abatement. Excludes atmospheric photochemical studies and biochemical studies related to effects of air pollution. 91

EFFECTS-HUMAN HEALTH

Covers medical and epidemiological studies; biological effects other than those on plants and livestock produced by air pollutants; laboratory animal experiments. 183

EFFECTS--PLANTS AND LIVESTOCK

Effects on vegetation--crops, trees, other plants--and on livestock as distinguished from laboratory experimental animals. 203

EFFECTS--MATERIALS

Deterioration, corrosion, etc., of physical materials, buildings, and structures. 211

ECONOMIC ASPECTS

Economic implications of air pollution and its control, e.g., economic losses from pollution damage, and costs of control programs or equipment in general. 215

STANDARDS AND CRITERIA

Recommended or adopted guides, criteria and standards for allowable emission limits or pollutant concentrations, air quality, equipment characteristics, and fuels. 217

page

LEGAL AND ADMINISTRATIVE

Legal aspects include legislation, ordinances, rules, litigation, hearings, decisions, etc. Administration covers administrative and miscellaneous information concerning control agencies and control and research programs. Typical topics are personnel, budgets, contractual activities and program descriptions. 219

SOCIAL ASPECTS

Sociological and psychological aspects such as social attitudes, public opinion studies, public relations, and public information. 225

GENERAL AND MISCELLANEOUS

Reviews of general problems, trends and background. Documents not assignable to other categories. 227

SUBJECT INDEX..... 233

AUTHOR INDEX..... 243

3565 APTIC NUMBER 12521

R. U. Ayers
ALTERNATIVE NONPOLLUTING POWER SOURCES. S.A.E. (Soc. Automot. Engrs.) J., 76(12):40-80, Dec. 1968.

An urban transportation crisis grips the nation--its symptoms: thickening pollution, rising accidents, and ever increasing congestion. Currently, emissions appear to be the most pressing problem, therefore, responsible engineers must now consider alternative nonpolluting power sources. External combustion engines with steam or another fluid as the working medium are available now as an economic alternative to the internal combustion engine. The major virtue of the external combustion engine is an almost complete lack of emissions without compromise of engine performance. Steam engines offer simplifications in power train design as they possess high torque at zero speed eliminating the need for a transmission. In hybrid systems, a small, constant speed internal combustion or external combustion engine drives a high-speed alternator-inverter which both powers electric motors at the wheels and charges a battery. While overall efficiency would equal that of present engines and emissions would be drastically reduced, the cost penalties for private automobiles would be substantial. Therefore, the use of hybrid systems appears likely only for specialized situations which might include trucks and buses. Electric propulsion systems based on lead-acid batteries are possible now for small, limited performance vehicles. If high energy batteries become an economic reality, small cars comparable to the Volkswagen and Renault will become possible. With the development of low cost fuel cells, fuel cell-battery hybrids will present an attrative alternative since the introduction of the fuel cell into the system would give these vehicles a much needed increase in range. The present state of development and a careful overview of the potential of these alternative energy systems is presented in detail.##

3566 APTIC NUMBER 12621

Benjamin, M., T. B. Douglass, G. A. Hansen, W. D. Major, A. J. Navarre, and H. J. Yarger
A GENERAL DESCRIPTION OF COMMERCIAL WOOD PULPING AND BLEACHING PROCESSES. TI-9 Pulp and Paper Committee. J. Air Pollution Control Assoc., 19(3):155-61, Mar. 1969.

The purpose of Informative Report No. 1, prepared by the TI-9 Pulp and Paper Committee of the air Pollution Control Association, is to present a general description of the commonly used processes for preparing and bleaching wood pulp. Further reports of a more specific nature will be published as these become available. (Author's Abstract)##

3567 APTIC NUMBER 12576

Blade, O. C.

BURNER FUEL OILS, 1968. Bureau of Mines, Bartlesville, Okla. Petroleum Products Survey No. 56., 37 pp., Sept. 1968.

The importance of fuel oils has resulted in the need for more information by the petroleum industry, manufacturers of heating appliances, and consumers regarding the types and qualities of the fuels currently being marketed. In this survey, data on a total of 348 samples of burner-fuel oil are presented. The fuels were manufactured by 34 petroleum refining companies, large and small, in 107 refineries throughout the United States. Summaries of the results of the tests by grades and by regions, compared with data for 1967, are presented in tabular form.##

3568 APTIC NUMBER 12622

Boehlen, B.
FLUORINE EMISSION AT ALUMINIUM WORKS. Chem. Eng., No 221, CE266-268, Sept. 1968.

The most important of the extraneous substances in the air which arise from alumina reduction are inorganic fluorine compounds, alumina, tar, carbon, sulfur dioxide, and carbon monoxide. The fluorine compounds are particularly important because of their toxicity to livestock and plants. Waste gas purification systems must be of two types: One for purification of the furnace waste gas and the other for purification of air from the premises. The first system for use with the Soderberg furnace consists of a combustion step with cyclone and electrostatic precipitator dust removal, and spray-type scrubbers or filter-plate columns for hydrogen fluoride removal. The system for purification of air from the premises consists of a spray chamber with synthetic fabric lining mounted on the roof. Purification of waste furnace gases from Soderberg furnaces results in a fluorine concentration in the pure gas of less than 10 mg/cu m, while the purification of air from the premises results in a fluorine concentration in the pure gas less than 2 mg/cu m.

3569 APTIC NUMBER 12623

A. B. Cambel
ECOLOGICAL ASPECTS OF THE AFFLUENCE AND EFFLUENTS OF ENERGETICS. Arch. Environ. Health. 18(2):276-289, Feb. 1969. 16 Ref.

Energy, a major benefit to mankind, is also a major threat to modern society. To examine the problems germane to energetics and how they may affect the environment, it is necessary to look at energetics as an integrated whole, i.e. as a technosocio-economic system. The report of the Interdepartmental Committee appointed by the late President Kennedy reviewed the long-term research and development needs in energetics to the year 2000 on this integrated basis. The findings of that

study group are reviewed here in relation to the Linton Report. After a brief survey of the energy sector, the affluence of energetics as cause for exhilaration and the effluents as cause for serious national concern are discussed. Possible remedies for the dangerous manifestations of energetics are explored.##

3570 APTIC NUMBER 13102

Carter, Christopher and Alwyn Jolly
LONGANNET CHIMNEY. Consulting Eng., 33(6):42-44, June 1969.

The reinforced concrete chimney at the Longannet Power Station, Scotland, is 600 ft high and designed to adequately disperse any contaminants remaining in the flue gas after electrostatic precipitation. The chimney is of multi-flue design with all boilers emptying into the single chimney for the purpose of combined efflux velocity for more buoyant gases because of the slower cooling rate of the greater mass of the combined gases. The flues extend 30 ft above the windshield of the chimney. This extension assists appreciably in avoiding downdrafts. Construction design is discussed.

3571 APTIC NUMBER 13562

Chandler, J. M.
EFFECTS OF ENGINE-OPERATING VARIABLES ON THE COMPOSITION OF AUTOMOTIVE EXHAUST GASES. Proc. Am. Petrol. Inst., Sect. III, 38:320-335, 1958. (Based on a report of the Variables Panel of the Coordinating Research Council Group on composition of exhaust gases, Aug. 1957.)

The effects of engine variables on the concentrations of hydrocarbons and nitrogen oxides in automotive exhausts are discussed. The factors affecting hydrocarbon concentration in exhaust gas are manifold vacuum, engine detuning, and cold as compared to hot engine starting. Manifold vacuum of more than 21.5 in. of mercury accounts for high hydrocarbon concentrations during deceleration. This effect is accentrated by manual transmissions as compared to automatic. Enriched carburetor idle setting increases hydrocarbon emission at cruising speeds up to 30 mph. Spark-plug condition is important because one misfiring plug may more than double the average hydrocarbon concentration. Among the variables affecting nitrogen oxides, air-fuel ratio is of primary importance. Lean mixtures promote the formation of nitrogen oxides and decrease the effects of other engine variables. Under full throttle, rich mixture conditions, the concentrations are relatively low. Under road-load cruise conditions and during fuel throttle accelerations, higher speeds produce higher concentrations. During part-throttle accelerations, speed has no effect, and high concentrations may be exhausted even at low speeds. During idling and deceleration, nitrogen oxides concentrations are so low as to be considered insignificant.

3572 APTIC NUMBER 13704

Chesluk, R. P.
ADDITIVES IN PETROLEUM. CRUDE OIL PRODUCTION AND REFINING FUELS AND LUBRICANTS. Lubrication, 54(8):85-96, 1968. 15 refs.

The petroleum industry makes extensive use of additives throughout its operation, from the oil well, through the integrated refinery processing sequences and in the individual final products. In petroleum processing, the refiner uses additives to protect his equipment from corrosion, fouling, and hydrogen blistering. This minimizes frequency of replacing equipment lost to corrosion, of removing deposit formation, etc. Through the use of additives in the final product, the refiner is assured that satisfactory performance will be provided by the individual products in their final application. (Author abstract)

3573 APTIC NUMBER 12624

J. Cholak, I. J. Schafer, D. Yeager
THE AIR TRANSPORT OF LEAD COMPOUNDS PRESENT IN AUTOMOBILE EXHAUST GASES. Am. Ind. Hyg. Assoc. J. 29(6):562-568, Nov.-Dec. 1968. 13 Ref.

The movement of particulate lead compounds from the exhaust of gasoline-driven motor vehicles on a heavily travelled high-speed roadway (120,000 vehicles/24 hr) is under investigation in the Cincinnati area. The findings for the first year of the investigation indicate an average concentration of 7.8 micrograms/cu m at the roadway, 1.7 micrograms/cu m 1300 ft to the leeward, and 1.1 micrograms/cu m at the station, 11000 ft leeward of the source of the Pb. The concentration of Pb in the air at the latter station is approximately the same as that of six years ago, as reported in the Public Health Service Publication No. 999-AP-12. The mass median equivalent diameter of the Pb particles was found to be approximately 0.30 micron, with 70% of the Pb being in the particles below 1 micron in diameter. Diurnal patterns reflected rush hour traffic as well as climatic conditions. Concentrations of Pb in soils and grasses varied according to the distance from the roadway, with most of the contamination occurring within 100 ft of the roadway. Author's Abstract##

3574 APTIC NUMBER 13701

Colombini, M., C. Mauri, R. Olivo, and G. Vivoli
OBSERVATIONS ON FLUORINE POLLUTION DUE TO EMISSIONS FROM AN ALUMINUM PLANT IN TRENTINO. Fluoride Quarterly, J. Intern. Soc. Fluoride Res., 2(1):40-48, Jan. 1969. 5 refs.

For many years, women and children complained of skin lesions similar to suffusions in an area of Trentino, near an aluminum plant. These lesions were first observed in the same place about 30 years ago. The symptomatology is related to damage to the vegetation due to emission of fluorine compounds. Since March

1966, three permanent stations were installed in the area in order to collect volatile fluorine compounds. Since February 1967, five deposit gauges were established at progressively increasing distances from the source. Fluorine air pollution has reached values close to and sometimes above 10 micrograms/cu m of air. Rain water collected for two weeks in the deposit gauges showed decreasing concentrations of fluorine the greater the distance from the source. The highest value of 7.13 mg/L was found in the deposit gauge closest to the factory. In the inhabited area, the fluorine content ranged between 0.14 and 2.55 mg/L. Since May 1967, the degree of fluorine pollution has decreased following installation of modern purification equipment at the plant. (Author summary modified)

3575 APTIC NUMBER 13892

Conklin, Edwin R.
1968 ANNUAL STATISTICAL REPORT: PART 2. Elec. World, 169(8): 69-96, Feb. 19, 1968.

The electric power industry is expected to add 172,105 Mw to existing generating capacity by 1974. This increase in capacity will amount to a gain of 60.5%. By 1970, nuclear power will account for 2.5% of the industry total as compared to 1.0% for 1967, and will, therefore, become an important segment of the electric power industry. The various aspects of electrical power generation and the capacity additions in different regions of the U. S. are presented graphically and in tabulated form.

3576 APTIC NUMBER 13814

Coolbaugh, William E. and Ray F. Weider
FLUID COLUMN ROASTING AT SHERBROOKE METALLURGICAL CO., LTD. PORT MAITLAND, ONTARIO. In: Pyrometallurgical Processes in Nonferrous Metallurgy, J. M. Anderson and P. E. Queneau (eds.), Metallurgical Society Conference, vol. 39, Am. Inst. Mining, Metallurgical, and Petroleum Engr., p. 45-58, 1967. (Based on a Symposium sponsored by the Extractive Metallurgy Div. of the Metallurgical Soc., Am. Inst. Mining, Metallurgical, and Petroleum Engr., Pittsburgh, Pa., Nov. 29-Dec. 1, 1965.)

The design of a vertical retort smelter using pelletized feed for roasting and a roaster design based on the New Jersey Zinc Co.'s Fluid Column process is reviewed. By using pelletized rather than sintered feed, the process keeps carry-over dust to a minimum and control of the low sulfate sulfur roast necessary for retort smelting is achieved. The calcine zinc oxide pellets produced yield briquettes equivalent to sintered calcine for zinc smelting, but the process is far less costly than sintering. The two roasters employed are shaft-type furnaces, approximately 17 ft high and 24 ft long. They are equipped with 32 in. wide hearths, and at the top of the fluid column level they flare at 50 deg angles to a full width of 10 ft. The end walls and the roof of each roaster are integral with the boiler. Fluidizing air is delivered through 6 in. pipelines and distributed to eight wind-boxes below the hearth of each roaster. Draft control of the roasting operation is maintained in an acid plant and with hot fans. The calcine produced during conventional sulfur elimination roasting averages less than 0.5% sulfide and 1.3 to 1.5% total sulfur. With lead-cadmium elimination roasting, 90% of the cadmium and 92% of the lead in the pellet feed can be eliminated. During conventional roasts, dust carry-over amounts to 10 to 15% of the total feed, under lead-calcium elimination conditions, carry-over is increased to 18 to 22% of the feed. Dusts are recovered in boilers, cyclones, and an electrostatic precipitator.

3577 APTIC NUMBER 12548

Craste, C.
FLUORIC POISONING. V. THE JURIDICAL PROBLEM.
((L'intoxication Fluoree. V. Le probleme juridique.)) Text in French. Rev Med Veterinaire, 104:13-20, 1953.

The problem includes (a) the proof of fluoric poisoning and (b) the estimate of damages. (a) The proof must rest on both clinical and chemical criteria. After a review of early procedures, the following factors are given as pertinent: 1. disease symptoms in an animal do not necessarily imply high fluorine content in the bones; 2. an animal must always be considered as having been a victim of fluorosis when its bone ashes contain more than 0.5% of fluorine (in CaF_2); 3. when the fluorine content is less than 0.25, the subject is free from the specific poisoning; 4. between 0.25 and 0.50, the animal may show costal nodosities, and these are not incompatible with the essential osteomalacia. Tooth enamel is particularly sensitive to fluoric poisoning. Blood and muscle laboratory tests are negative. Urine tests are valueless unless supported by fluorine and fluoride tests of air and fodder. Urine tests on humans, however, may point to further useful research applicable to animals. (b) Losses due to "factory disease" may be direct or indirect. The former include damages due to the settlement or death of the sick animals. Settlement, by mutual agreement, is subject to the positive results of the tests, and this is a source of conflict. The indemnity must cover the replacement value plus medical and other expenses. Indirect losses include cost of substitution fodder during the illness, and the loss in value of the establishment permanently exposed to fluoric pollution. Further remarks must await the outcome of instances currently before the courts.##

3578 APTIC NUMBER 13353

Cross, F. L., Jr. and R. W. Ross
FLUORIDE EMISSIONS FROM PHOSPHATE PROCESSING PLANTS. Fluoride Quarterly, J. Intern. Soc. Fluoride Res., 2(2):97-105, April 1969. 4 refs.

A three-part study to determine the extent of an area affected by fluoride emissions from a phosphate plant gypsum pond led to the following conclusions: Monitoring of fluorides by static air samplers at distances up to 8000 ft from the pond indicates a break point in concentration at one-half mile. The F levels

drop off rapidly to this break point. In citrus leaves from groves close to the pond, fluoride concentrations up to 75 ppm were found in spring flush. Similar amounts were found in young leaves at one-half mile from the pond. Concentrations taken before November may serve as an indicator of air pollution which can result in a reduction of citrus yield. A one-mile protective buffer zone for a phosphate plant might be considered adequate for citrus groves but would not necessarily be adequate for row crops or ornamental flowers such as gladiolus. Studies conducted on the surface of the pond by means of a specially constructed sampling shelter demonstrated fluoride emissions up to 0.16 lb/acre/day. At least 26 lbs of fluoride/day were emitted from the 160-acre pond. (Author conclusions modified)

3579 APTIC NUMBER 13596

Cunningham, George H. and Allen C. Jephson
ELECTROLYTIC ZINC AT CORPUS CHRISTI, TEXAS. Trans AIMEE (Am. Inst. Mining Metallurgical and Petroleum Engrs.), Vol. 159, p. 194-209, 1944.

The design of the plant includes the use of Trail suspension roasting equipment, contact acid equipment, and batch leaching in mechanically agitated tanks. Pressure filtering and washing of leach pulp and batch purification are followed by clarification in filter presses and cooling of purified solution by evaporation. Electrolysis is carried out in cells using Tainton alloy anodes and aluminum cathodes. Cell temperatures are held within desired limits by circulating cell solution through cooling towers. Steam-driven generators are used to provide direct current for electrolysis. The cathode zinc is melted and cast into slabs for shipment. Plant roasting capacity is 140 to 240 tpd. Steam is generated in three boilers, each with a capacity of 6000 to 12,000 lb of steam per hr at 150 psi, and amounts to about 0.7 lb per lb of concentrate roasted. Boiler gas at 8500 to 10,500 cu ft per min and 320 C is fed to separate cyclone units. The gas is passed from the cyclones to two cottrell precipitators, each with a capacity of 18,500 cu ft per min at 250 C, and on to the acid plant. The H2SO4 section consists of a standard Leonard-Monsanto contact unit using vanadium mass converters to produce 125 tons of 100% acid daily.

3580 APTIC NUMBER 13386

Dahm, H. P. and V. Loras
AUTOMATIC CONTROL OF PULP CHLORINATION. Tappi, 46(1):40-41, Jan. 1963. 20 refs.

A new ferrous-ferric oxidation-reduction system will give far better control of continuous pulp chlorination than the redox oxidation potential system. In contrast to the redox method, it is completely reversible and has a reproducible standard potential. Determination of chlorine is rapid and accurate and independent of the hydrolysis of the chlorine or the presence of chloride ions. In this method, the chlorine-containing sample is mixed in constant proportions with a standard solution of iron salts in which 80% of the iron ions are present in the ferrous state and 20% in the ferric state. The change of the ferrous/ferric ratio is then measured as a concentration cell potential directly proportional to the amount of chlorine present.

3581 APTIC NUMBER 13057

Debrun, G.
PREVENTION OF ATMOSPHERIC POLLUTION CAUSED BY THE POWER STATIONS OF ELECTRICITE DE FRANCE. (Les problemes de prevention de la pollution atmospherique provoquee par les centrales thermiques Electricite de France). Text in French. Chim. Ind. (Paris), 99(7):964-968, April 1968.

Principal pollutants emitted by the French power stations are fly ash, soot and sulfur oxides. To reduce these pollutants, the efficiency of dust collectors in old installations has been improved. All new stations are equipped with control apparatus to monitor the collectors, and existing equipment has been improved with regulation of the gas flow, addition of supplementary fields, and modernization of generators. Sulfur trioxide injection in the combustion gas has also been tried. Because of pollution control efforts, the emission of particulates from French power stations decreased from 109 kilotons in 1959 to 35 in 1966, while power output increased. Soot has been eliminated in the newer power stations, which burn heavy fuel oil, through careful control of combustion conditions, while in older installations the soot is neutralized with an alkaline reagent (ammonia, dolomite, magnesia, etc.). Dispersion of plumes has been accomplished by increasing the height of chimneys in several cases, and through research, determining the micrometeorological conditions necessary to disperse plumes. Research is being conducted in all these areas, and Electricite de France has set up a laboratory specializing in problems of atmospheric pollution.

3582 APTIC NUMBER 13602

Eyre, R. E.
SUSPENSION ROASTING OF ZINC CONCENTRATE AT TRAIL, BRITISH COLUMBIA. Can. Mining Met. Bull. (Montreal), 54(592):589-594, Aug. 1961. 3 refs.

Conversion to suspension roasting at Trail has resulted in a greater unit capacity, improved S elimination, and a higher percentage of SO2 in the gases. The drying operation reduces the moisture content of the wet zinc sulfide concentrate from 5 to 12% to 0.5%. Grinding is done in a 10 ft by 48 in. Hardinge mill with air classification. The fine dry feed from the mill is transported by screw conveyors and bucket elevators to 25-ton hoppers above each roaster. Tangential entry of the concentrate into the burner and the use of burner vanes assures complete mixing of the gases and concentrate. Chamber temperature is maintained at 1750 to 1875 F. Gaseous products at 1800 F pass directly into a water-tube boiler where they are cooled to 550 F and 20% of the entrained dust is settled out. Two parallel cyclone separators remove 90 to

95% of the remaining dust burden. The relatively clean gas is discharged from the separators at 525 F and fed to an electrostatic precipitator, then on to the acid plant. The precipitator removes 95% of the remaining dust. The final calcine consists of the hearth product and the dust products collected in the boilers, cyclones, and the precipitator. Slightly more than half of the thermal value of the concentrate is recovered in steam at 190 psi.

3583 APTIC NUMBER 12996

Plockenhaus, C. and K. Lutzke
BURNER TESTS ON A CUPOLA FURNACE FIRED WITH NATURAL GAS AS SECONDARY FUEL. (Brennerversuche an einem Kupolofen mit Erdgaszusatzfeuerung). Text in German. Interna. Z. Gaswaerme, 18(6):207-215, June 1969. 6 refs.

After investigations in the USA and USSR, tests were carried out last year at Isselburg, Lower Rhine, in Germany with the object of determining the feasibility of using natural gas as a secondary fuel in conjunction with coke or as a substitute for coke in cupola furnaces. Another aim of these tests was to reduce the emission of dust and ash and to increase the production rate. The Gas Heat Institute of Essen tested the secondary fuel burners for their reliability under cupola pressure variations from 300 to 800 mm WG. In addition, burner reliability was determined in the range 1:1 to 1:3 at excess air ratios between 0.7 and 1.2. The installation of temperature and gas sampling probes in the cupola made it possible to plot temperature and concentration profiles in the empty cupola and when the cupola was charged with inert stock or coke. The temperature and concentration readings obtained from the empty cupola agreed with calculated values. Profiles obtained from cupolas filled with inert stock showed a uniform distribution across the cupola, while results obtained from the coke-filled cupola showed that the cupola functions as a gas producer when the burners are in operation. It is concluded that in full-scale operation it is feasible to increase the melting rate, reduce the emission of dust, and replace roughly 50% of the coke by natural gas. This gives substantial economies in cupola operation. (Author abstract modified)

3584 APTIC NUMBER 13053

Frantz, Robert L.
COAL STRENGTHENS ITS POSITION. Mining Engineering, 21(2):104-107, Feb. 1969.

Coal produces almost 2/3 of all the electrical energy generated by fossil fuels and 1/4 of all energy consumed in the U. S. Power company interconnections and cooperative agreements are being arranged to enhance power supply reliability and achieve minimum power costs. Many oil companies are seeking coal company affiliations or reserves. These mergers bring to coal companies a source of capital and expanded base operation for greater expansion potential. A commercial coal liquefaction plant will probably have a capacity of 100,000 bbl per day. It will require coal reserves of 400 to 650 million tons, with the mines producing 10 to 15 million tons per year. The magnitude and complexities of new mining operations require a high degree of engineering analysis and research to determine economic feasibilities and justify investments. A more concerted and intensive effort in the coal industry is required to attract additional manpower and expand training programs in the areas of production, maintenance, management engineering and safety.

3585 APTIC NUMBER 13524

Fuller, F. T.
PROCESS FOR DIRECT SMELTING OF LEAD CONCENTRATES. J. Metals, 20(12):26-30, Dec. 1968. 2 refs.

St. Joseph Lead Company has recently been investigating a single-step lead smelting operation involving a new approach and several new ideas. Costly handling of the intermediate product (sinter) would be eliminated, fuel for heating and reduction would be eliminated, as would recirculation of diluent. Off gases would be rich in SO2 making recovery as sulfuric acid economically attractive, and concentrates could be used as received. The process involves direct reaction of oxygen and PbS in a gas bubble in a lead bath. The reaction vessel resembled a slice cut from a Pierce Smith converter. A large square opening served as a gas and fume exit. Gas and fume leaving the converter were drawn into a short section of flue which then joined the plant dust-and gas-handling system. While the blow was in progress in the converter, the gas stream was analyzed for SO2, oxygen, and nitrogen by means of a continuously operating chromatograph on a 2-minute cycle, and a strip chart recorder. Fume samples were collected. This condition was maintained by an automatic controller. The theoretical maximum for SO2 in flue gases is 16.6 percent, and 13 to 14% were obtained.

3586 APTIC NUMBER 13794

Gallagher, John T.
COST OF DIRECT-FIRED HEATERS. Chem. Eng., 74(15):232, July 17, 1967.

Two curves are given to help estimate the material and shop fabrication costs of radiant-convection and all-radiant heaters. Heater costs are normally compiled as $/million Btu/hr of absorbed duty. The first curve relates the approximate purchase price of heaters to absorbed heat duty. Twenty million Btu represents the economic boundary for shipment of the heater to the field in one piece. Labor costs are greater when on-site assembly must be made. All-radiant heaters cost less initially than radiant-convection heaters of comparable size. Quite often though, the economics may favor the higher initial cost of the radiant-convection heater with its correspondingly lower fuel requirements and operating costs. An illustrative example is provided.

3587 APTIC NUMBER 12990

Gruson, G. and E. Hanke
PROBLEMS OF THE REMOVAL OF NITRIC OXIDE IN ELECTROSTATIC PRECIPITATORS. (Probleme der Stickoxidentfernung beim Elektrofilterbetrieb). Text in German. Freiberger Forschungsh. A, no. 413:37-73, 1967. 36 refs.

The problem of the nitric oxide formation in electrostatic precipitators was studied both by an extensive literature search and by experiments. It is well known that NO is involved in the precipitation of tars and rosins in electrostatic precipitators used in gas works. However, it is less known under what circumstances NO is produced or destroyed by the effect of high potentials. Nitric oxide measurement techniques and theoretical understanding of the processes are herefore of economic significance for gas works. After a discussion of the partially contradictory results reported in the literature, measurements in a gas and a coke plant are described which prove that electrostatic precipitators for tar increase the NO concentration and thereby the tar content of the gas. The Ilosvay method used for the NO measurements is described, as well as the preparation of NO samples for its calibration. In this method, the NO in the gas is first oxidized to NO2 by KMnO4. The NO2 is then scrubbed by the Ilosvay solution consisting of sulfanilic acid and alpha-naphthylamine. The reaction produces p-benzenesulfonic acid-azo-alpha-naphthylamine, which is measured photometrically. This method detects 50.0% = or - 1.2% of the NO. As results of experiments with electrostatic precipitators, the formation of NO as a function of the potential with various model gases is reported. At O2 concentrations between 0.4 and 1.5%, both NO and NO2 are formed at potentials up to 60 kV. In the presence of up to 8 g ammonia per cu m, only NO (up to 80 cu cm/cu m) was formed. The significance of these results, together with the research findings reported in the literature, is discussed.

3588 APTIC NUMBER 13135

Hanslian, Lubomir
OCCURRENCE OF HEXAVALENT CHROMIUM IN INDUSTRIAL CONDITIONS. (VYSKYT SESTINOCNEHO CHROMU V PRUMYSLOVYCH PODMINKACH). Text in Czech. Pracovni Lekar., 4(21):142-145, 1969. 17 refs.

Hazards chromium exposure may not be limited to the generally known occupations where hexavalent chromium (Cr VI) is found; hazardous exposure may also occur upon contact with trivalent and elemental chromium. This is seen in the increasing number of eczemas among people working solely with the latter forms of the metal. Oxidation of elemental Cr and Cr III to Cr VI can occur under suitable conditions, especially in alkaline medium and at high temperature. The presence of Cr VI was demonstrated in nearly all cements of Czechoslovak origin, in chromamagnesite bricks, cement prefabricates, transite, chromic oxide and its products, in cooling liquids and emulsions, in basic electrode welding atmospheres, foundry-moulding sands, chrome tanning leathers, and during Al2O3 production. Estimated concentrations of Cr VI ranged from 0.01 to 66.0 mg %, i.e., great enough to induce allergy. It is recommended that elemental chromium and Cr III concentrations be taken into account when calculating Cr VI concentration. Steps to prevent Cr VI formation might include substitution of a neutral or acidic medium for the alkaline one and addition of suitable antioxidation compounds.

3589 APTIC NUMBER 13640

Hino, Yoshinori
ON SULFUR CONTENTS IN COMBUSTION GAS FROM BROWN COAL. (Kattan nensho hai gasu chu no iwo ganyuryo ni tsuite). Text in Japanese. Netsu Kanri (Heat Engineering, Tokyo), 21(5):38-43, May 1969.

Of all combustion gases, sulfur dioxide receives the most attention, since the degree of air pollution is generally measured by the amount of sulfur dioxide. Sulfur in its liquid and solid states is found in combustion gas whenever it is burned. Ashes of brown coal contain larger amounts of lime and magnesium present as CaSO4 and MgSO4. In the case of brown coal from the Rhine district, Germany, a large quantity of sulfur is found in the combustion ashes and the amount of sulfur present in the combustion gas is therefore lessened. More than 30% of the electric power in West Germany is produced in the Rhine district. Brown coal, costing little and containing little sulfur in its combustion gas, is the primary energy source for this electric power. To discover the outstanding advantage of this coal, tests were conducted with a variety of equipment in the boiler of a mountain power plant's briquet factory. Sulfur dioxide concentrations were measured with Woesthoff equipment and sulfur trioxide by the Stratmann-Schuster method. To check the amount of sulfur in combustion gases, the on-balance content of sulfur in ashes was also investigated. Experimental results indicate that the longer the combustion gas remains in the boiler, the greater the amount of sulfur formed.

3590 APTIC NUMBER 13242

Hollander, Egon
CONDITIONS FOR RELEASING FLUORINE DURING THE DECOMPOSITION OF PHOSPHATES WITH SULFURIC ACID. (Podmienky uvolnovania fluoru pri rozklade fosfatov kyselinou sirovou). Text in Czech. Chem. Prumysl (Prague), 18(2):65-67, 1968. 14 refs.

Conditions were determined for releasing fluorine, during the decomposition of the most commonly used natural phosphates by means of acids. In the decomposition of fluoride phosphate, relatively little fluorine is released [illegible]% in the USA, 40 to 45% in the USSR, and 33.7 to 42.8% in Czechoslovakia. In manufacturing concentrated and combined fertilizers, where the amount of fluorine released is considerably less, additional fluorine is released through the manufacture of the superphosphate. Factors that influence the process include type of phosphate, temperature, concentration, fineness of the grain, and the amount of acid used. The higher the concentration of sulfuric acid, the greater the concentration of phosphoric acid. When concentrations of phosphoric acid range to 30% P2O5 at

temperatures of 95 to 100 C, evaporation of the acid is low; with more than 40% of P2O5, evaporation rises sharply. The amount of fluorine released is directly proportional to the temperature, the amount of acid used for the reaction, and the fineness of phosphor grain. The reaction is also facilitated by using active matter with the acid.

3591 APTIC NUMBER 12633

F. E. Ireland
POLLUTION BY OXIDES OF SULPHUR. Chem. Eng., No. 221, CE261-262, Sept. 1968.

The sources of sulfur oxide pollution include the combustion of sulfur-bearing fuels such as coal, coke, and fuel oil, the manufacture of sulfuric acid, miscellaneous uses of sulfur dioxide, and the combustion of sulfur compounds in waste gases from manufacturing processes. This is a brief report of these pollution sources made to the Working Party on Air Pollution of the European Federation of Chemical Engineering.##

3592 APTIC NUMBER 12630

A. Jamison
STEAM CARS. JET TYCOON, OTHERS, ESPOUSE THE CAUSE.
Science, 163(3865):370-374, Jan. 24, 1969.

While the auto industry and the federal government continue to study the feasibility of alternative forms of automotive power that will not emit harmful pollutants into the air, William P. Lear is putting his business experience and his money into the production of steam engines. He expects to unveil a racing car and a prototype passenger car in February. With plans to produce 1000 engines a day by the end of 1970, he promises to have steam cars on the market by mid 1970. A competitor, Thermodynamic Systems plan to start production in February of steam engines for applications other than automobiles.##

3593 APTIC NUMBER 13380

Jansson, Lennart B.
PROCESS MODIFICATIONS IN KAMYR CONTINUOUS KRAFT COOKING SYSTEMS.
Tappi, 46(5):296-301, May 1963. (Presented at the 16th Alkaline Pulping Conference, Tech. Assoc. of the Pulp and Paper Industry, Savannah, Ga., Nov. 1-2, 1962).

A description is given of the digester system from chip feed to discharge of stock. The various development stages of the cooking system are discussed in chronological order, starting with the hot blow process and followed by the cold blow and diffusion-extraction processes. Also, the high heat diffusion washing is described. Some operational data for diffusion-extraction and high heat diffusion washing are presented. (Author abstract modified)

3594 APTIC NUMBER 13410

Jones, J. F., R. T. Eddinger, and L. Seglin
MULTISTAGE PYROLYSIS OF COAL. Chem. Eng. Progr., 62(2):73-79, Feb. 1966. 3 refs.

Fluidized bed pyrolysis of coal, a process for upgrading coal by converting it to an oil, a gas, and a char, and to decrease the delivery of coal energy, is described. The coal used in testing the method was Illincis No. 6-seam coal. Multistage pyrolysis of coal was carried out in four stages. The temperature at each stage differed; liquor, char, crude oil, and gas were the by-products. Gases and dust leaving the reactor were quenched with water in venturi-type scrubbers and fibrous glass wool filters. Non-condensable gases were scrubbed to remove CO2, and yield a 550/btu/cu ft fuel gas, or the gas may be converted after scrubbing to produce a synthetic pipeline gas. The gas may also be converted to hydrogen and utilized in fertilizer. Tables evaluating the economic effects of multistage pyrolysis are given.

3595 APTIC NUMBER 13610

Justus, Edgar J. and Kenton J. Brown
CONTINUOUS DIGESTOR. Beloit Corp., Wisconsin, U. S. Pat. 3,311,530. 6p., March 28, 1967. 3 refs. (Appl. June 28, 1963, 10 claims.)

An improved continuous chemical pulping process is described. Wood chips of any type are first preconditioned for 3 to 5 min in a weak alkaline black liquor at approximately 200 F to remove air and some of the noncondensable gases from the material. The black liquor is replaced by white liquor in a saturation zone. This stage lasts for 30 to 40 min, during which the temperature is raised from 220 to about 290 F and the pressure is decreased from 140 to about 120 psig. Alkali concentration during saturation is gradually increased from an initial value of 15 gm/l of effective alkali to 30 gm/l during the first 15 min and then allowed to decrease slowly for the remainder of the saturating period. Treatment should be carried out until the mass being treated absorbs 14 to 18% by weight of active alkali. Sulfidity of the cooking liquor should be at least 25% when using kraft liquors. The ratio of liquid to fibers during digestion is kept at about 4 to 1, and treatment time is between 50 and 60 min at 350 F. Alkali concentration is decreased until a final concentration of 10 to 12 gm/l is reached. Digestion is terminated by dilution with a liquor of lower temperature and concentration.

3596 APTIC NUMBER 12252

John M. Kane
FOUNDRY AIR POLLUTION (A STATUS REPORT). Foundry, 96(11):50-55, Nov. 1968.

The entire subject of air pollution in foundry production and some solutions to the major problems are surveyed. Cost of air pollution control equipment is a function of gas volume, particulate size, and temperature of the contaminant carrier gas

stream. The quantity of contaminant plays a secondary role in control equipment cost. Emissions from arc furnaces are essentially small-micron and submicron-sized metallic fumes, but they can be confined in modest exhaust volumes by local exhaust techniques. Systems can be grouped into canopy, local exhaust, and direct evacuation methods. Each of these systems is discussed. To date, the cleanup of the cupola stack has been difficult and expensive. Gas volumes are large because of the quantity of blast air used and the necessity of maintaining large charge door openings at which indrafts introduce up to twice the blast volume into the stack gases. Several types of equipment are available for use on cupolas, with varying cost and effectiveness. They are: wet cap, dry centrifugal and medium-pressure-drop wet collectors, and fabric and high-energy wet collectors. With cupolas, control cost is disappointingly high because of large gas volumes and the need to incinerate unburned oil and burn carbon monoxide.##

3597 APTIC NUMBER 12656

S. Kinsman
PUBLIC ACCEPTANCE OF THE NUCLEAR AGE. J. Environ. Health, 30(4):379-394, Jan.-Feb. 1968. 17 refs.

Despite the evidence in favor of nuclear power, it is still not accepted by certain factions of the general public. The author suggests now is the time to change this public attitude and he outlines methods of educating the public. Without a change in attitude, he says, public misunderstanding will threaten the future development of nuclear energy. (Author's Abstract)##

3598 APTIC NUMBER 13037

Knop, Wilhelm
AMMONIUM NITRATE FERTILIZER STOREHOUSES AS NITROSYL EMITTERS. (Volldunger-Lager als Nitrose-Emittenten). Text in German. Wasser Luft Betrieb, 13(6):221-223, June 1969. 9 refs.

The difficulties associated with the storage of ammonium nitrate are reviewed. Its thermodynamically unstable structure renders it explosive under an initial impact. Frequently, admixture of inert compounds suffices to preclude the possibility of explosion. It has been shown, however, that even such salt mixtures will decompose under external thermal activity. This decomposition spreads slowly at relatively low temperatures over the entire amount of ammonium nitrate, accompanied by evolution of larger amounts of volatile, partly toxic, decomposition products. Known products are H2O, N2, N2O and NO2. These substances are present in the ratios of about 8:4:2:1. Hydrochloric acid constitutes 4 to 6.4 wt % of the decomposition products, NO and CO2 - each at 0.5 to 2 wt %, and hydrofluric acid at 0.8 to 1.5 wt %. Other substances, such as CO, NH3 and Cl2 are present in amounts less than 1%, while nitrosyl chloride and phosgene are altogether undetectable. The principal topics of the paper are the safety measures, the store rooms, the means of transportation and the operation of store houses for ammonium nitrate fertilizers. A discussion of the German regulations concerning the above topics concludes the paper.

3599 APTIC NUMBER 13192

Kott, Gary L.
PROCESS COMPUTER CONTROL OF A BLEACH PLANT. Tappi, 50(7):41A-42A, July 1967.

A bleaching process is described which is controlled by seven closed supervisory loops. The system uses 14 instrument inputs, manual entries, and appropriate programs and hardware. Data collection, personnel orientation, and project maintenance are also important to the computer control project. This method has produced a stable bleaching process, which is thought to be superior to conventional control. (Author abstract modified)

3600 APTIC NUMBER 13281

Kotzerke, Donald F.
HOW SCOTT PAPER INCREASES SULFITE PULP YIELD BY COOKING REJECTS. Am. Paper Ind., 48(8):39-40, 42, Aug. 1966.

Experiments were performed to determine which common cooking media would be best suited to economically utilize knotter rejects in sulfite pulp production. Sulfurous acid, acid sulfite, and bisulfite cooking media were rejected due to high bleach demand and high percent screening. The kraft process proved successful, but the soda medium was found to be equal in product quality and better economically. The knotter rejects required very little soda addition and additional sulfur was not required. The caustic cooking of upgraded rejects produced pulp of high quality, low percent screening, strength of approximately 80% of normal sulfite pulp, bleach demand in the 4 to 8% chlorine number range with easy bleaching characteristics and low shrinkage during bleaching.

3601 APTIC NUMBER 13141

Kreimann, Herbert H. and Earl K. Rickard
HEAT EXCHANGE SYSTEM FOR HEATING MILL AIR AND FOR REHEATING STACK GAS SUBSEQUENT TO WET SCRUBBING. (Combustion Engineering, Inc., Windsor, Conn.) U. S. Pat. 3,447,492. 3p., June 3, 1969. 3 refs. (Appl. Dec. 27, 1967, 7 claims).

A fossil fuel-fired steam generator having a wet scrubber for removing sulfur and other impurities is described. A rear gas pass in the furnace, through which the combustion gases flow, is connected to the wet scrubber. A heat exchanger is positioned in the rear of the gas pass for absorbing heat from the hot combustion gases before they enter the scrubber. Another heat exchanger is positioned in the stack for heating the cleaned gases before they are discharged into the atmosphere. By raising the temperature of these gases, all the moisture they contain is evaporated, and they are able to leave the stack at an increased velocity. Both these factors help prevent a visible plume of the gases exiting from the top of the stack.

3602 APTIC NUMBER 13840

Krumin, Peter O.
THE MEIGS CREEK NO. 9 COAL BED IN OHIO. PART III FURTHER STUDY OF THE CHEMICAL AND PHYSICAL PROPERTIES, AND WASHABILITY CHARACTERISTICS, WITH A BRIEF REVIEW OF NEW METHODS EMPLOYED. Ohio State Univ. Studies, Eng. Ser., Eng. Exp. Station Bull. no. 165, 26(3): 375p., July 1957. 181 refs.

The results of examining some existing methods and of developing new or modified methods for the determination of various properties of coal are reported. Equilibrium moisture, mineral CO2, total S by the LECO high-frequency induction furnace method, forms of S, low-temperature carbonization, and float and sink testing of both coarse and fine coal are covered. The results of studying 57 samples from the Meigs Creek no. 9 coal bed are given. Seventeen composite samples were prepared from the 57 individual sections. Each of these represented the cross section either of separate benches or of the entire thickness of the coal bed at 14 sampling sites. Fifteen of the composite samples were screen-sized, and each screen size was analyzed for moisture, ash, and S. The results of screen analyses are presented in tabular and graphical form. Results of the float and sink tests on the 17 composite samples are presented in tabular and graphical form, as washability curves. 'Float ash' curves for various screen sizes obtained from the same sample for each of 15 composite samples are presented to show the effect of crushing on ash reduction, or yield of float coal at a selected constant ash content. Heating values in all specific gravity fractions of one screen size from each of the 17 composite samples were determined. The results of the study of analytical methods and the results of the investigation of Meigs Creek no. 9 coal are summarized in 63 tables, 134 data sheets, and 29 figures. (Author summary modified)

3603 APTIC NUMBER 13647

Kuroiwa, Tadaharu
ON TECHNICAL IMPROVEMENT OF MINING AND SAFETY IN QUARRYING INDUSTRY. (Saiseki gijutsu narabini saiseki kogai no mondaiten to taisaku). Text in Japanese. Nippon Kogyo Kaishi (J. Mining Met. Inst. Japan), 85(973):357-367, 1969. 31 refs.

Due to a sharp decrease in gravel production, demand for broken stones increased to 170 million tons in 1968; the planned output for 1970 is 210 million tons. Although total output is increasing, most quarries have only small-scale production facilities and produce at the most 10,000 tons per month. The monthly productivity per worker is approximately several hundred tons. Modernization of quarry operations is discussed from the technological and engineering viewpoints. Dust production is briefly treated as an industrial hazard to the public and workers. The amount of dust produced by quarries depends partly on the machinery used. It ranges from 12 to 3000 mg/cu m. Workers exposed to these dusts are vulnerable to silicosis. Humidification of working areas by constant watering and the use of suction devices are recommended to minimize dust concentrations. Use of masks and periodical physical checkups are mandatory.

3604 APTIC NUMBER 13795

Lawson, S. D., Sr., J. Byrne, A. R. Cunningham, D. L. Hendrickson, and P. L. Winkler
ECONOMICS OF CHANGING VOLATILITY AND REDUCING LIGHT OLEFINS--U. S. MOTOR GASOLINE. Proc. Am. Petrol. Inst., Div. Refining, vol. 48:643-704, 1968. 28 refs.

Three simulated refineries were used to evaluate five changes in gasoline specification. These included one higher and two lower levels of motor gasoline volatility and two levels of reduced light olefin content at constant volatility. The results were then extrapolated to obtain information applicable to the entire U. S. Summaries of added costs and investments for the various cases studied are tabulated. The costs are presented relative to two reference points, the base case and the modified case. The base cases resulted from a rigorous simulation of the actual refining operations conducted in the year 1965, including the proportion of zeolite cracking catalyst which was actually being used during that year. The modified base cases were obtained by allowing for the increased use of zeolite catalyst from 30 to 100% and the addition of capital investment. It is concluded that it is technically possible with present refining technology to manufacture motor gasoline of substantially lower volatility or reduced light olefin content.

3605 APTIC NUMBER 13695

Leithe, Wolfgang
MAINTENANCE OF CLEAN AIR - AN URGENT TASK FOR CHEMISTRY AND ECONOMY. (Reinhaltung der Luft - ein dringendes Anliegen fur Chemie und Wirtschaft). Text in German. Allgem. Prakt. Chem. (Vienna), 18(8):411-413, Aug. 1967. 4 refs.

Air pollution stems from three sources; domestic heaters, automobiles, and industry. Domestic heaters were the main cause of the London smog episodes of 1952 and 1956. The Clean Air Acts of 1956 were directed at reduction of emissions by domestic heaters through the use of gas, coke, and oil-fired heating systems. As a result, the smoke hovering over the city was reduced by two-thirds. The SO2 content did not decrease, however. The number of respiratory diseases also dropped markedly. Automobile exhausts and the special climatic conditions in Los Angeles have created tremendous air pollution problems there. But even without sun radiation, all major cities are plagued nowadays by automobile exhausts. Regulations which will become effective in the U. S. in 1968 limit the CO and hydrocarbon content of the exhaust gases to 15,000 to 23,000 ppm for the former and 275 to 400 ppm for the latter. Pollutant emission by automobiles can be reduced either by better combustion in the cylinder, by preventing leakage of incompletely burned components into the crankcase, or by

afterburners. The industries of the industrial center of the Ruhr Valley have performed a tremendous job in limiting dust emissions. Although coal consumption in thermal power plants doubled since 1952, emission of fly dust was reduced by 30%. The cement industry trippled its production since 1950, yet dust emission sank to one third of the 1950 level. Industry's biggest problem at the moment is the removal of SO2 from stack gases. The wet scrubbing method developed in England (Battersea-Howden-ICI-method) succeeds in eliminating 80% of the SO2, but the waste gas loses its thermal buoyancy. No such problem is encountered with dry methods, but none of the methods is developed sufficiently to be recommended.

3606 APTIC NUMBER 12639

C. J. Lewis, B. B. Crocker
APCA TI-2 COMMITTEE TECHNICAL INFORMATION REPORT NO. 10. THE LIME INDUSTRY'S PROBLEM OF AIRBORNE DUST. J. Air Pollution Control Assoc., 19(1):31-39, Jan. 1969.

The major air contaminant from lime operations is dust: limestone dust from mining, handling, crushing, and screening operations; quicklime dust from kiln discharge, handling, shipping and milling operations; hydrate lime dust from hydrator operations, milling, and packing. These dusts are generally looked upon by the community as a nuisance rather than endangering health. While in the past the industry has relied on a good neighbor policy with reference to dust control procedures, the current and proposed air pollution legislation will probably require compliance with regulations on particulate emission, visibility, fuel limitations, and settleable alkalies. Codes relating to each of these pollutants are discussed. Methods of control for specific contaminants include: wetting, cyclones, dust settling chambers, bag filters, electrostatic precipitators, and wet scrubbers. These are all discussed in relation to the operations with which they are used.##

3607 APTIC NUMBER 13479

Little (Arthur D.) Inc., Cambridge, Mass.
FUTURE MARKET FOR UTILITY COAL IN NEW ENGLAND. Contract 14-01-0001-489, Nov. 1966.
CFSTI: PB 176 540

If no action is taken to reduce delivered coal costs from present levels, utility coal consumption in New England, after experiencing a steady growth, will reverse and begin a steady and continuous decline. At first this will be due to loss of the existing plant market to residual fuel, and later to loss of new plant market potential to nuclear power. If, as a consequence of initiating purchasing and transportation innovations, the delivered costs of coal can be reduced, coal can experience expanding demand through 1970. The potential market for coal appears large and stable enough to justify taking action to reduce delivered costs. Incentives for such action in the form of lower fuel costs, increased coal sales, or higher gross weight revenues realizable by individual companies seem more than adequate. There is also the incentive of preserving coal as an effective competitor in New England's fuel economy.

3608 APTIC NUMBER 13699

MacDonald, M. E.
FLUORIDE AS AIR POLLUTANT. Fluoride Quarterly, J. Intern. Soc. Fluoride Res., 2(1):4-12, Jan. 1969. 31 refs.

Fluoride compounds reach the air from two sources: volcanic action and man's industrial activities. The two greatest acute air pollution episodes occurred in Belgium's Meuse Valley and in Donora, Pa. In both disasters, there was evidence of acute fluoride poisoning. The sources of industrial fluoride pollution are coal, clay, cryolite, fluorspar, hydrogen fluoride, and phosphate rock. About half the bituminous coal consumption in the United States for 1963 was utilized by electric power utilities. Vegetation in several counties in California has been adversely affected by fluoride emissions from brick, tile, and pottery factories. Cryolite, used in the production of aluminum, has been traced as a source of damage to vegetation, livestock, and human health. Fluorspar and hydrogen fluoride are used in steel production, and the latter is also used in the production of high-octane gasoline. Many cases of eye irritation were recorded shortly after a Los Angeles refinery began using hydrogen fluoride. Fluoride emissions from the production of phosphate fertilizer, phosphoric acid, and phosphorus have been responsible for damage to vegetation and livestock, and respiratory ailments in people. Control of fluoride emission may be achieved by a variety of scrubbers and electrostatic precipitators.

3609 APTIC NUMBER 13219

Hasek, Vaclav
ARSENIC IN COKE. (Arzen v koksu). Hutnicke Listy (Prague), 24(5):323-325, 1969. 18 refs.

Arsenic contained in coal used in coke ovens directly influences the quality of the coke and consequently the quality of cast iron and steel and of electrodes. The material of primary importance is black coal, in which arsenic is not evenly distributed. Arsenic content in a combustible is determined either by change of arsenic compounds to gaseous arsenic oxides or by transformation of arsenic compounds to volatile arsenic trichloride. Field testing of 35 specimens showed that the arsenic content is very low (0.002 to 0.005 mg/cu m). The present average value of arsenic allowed is 0.3 mg/cu m. In all places tested, the measured value was much lower than the allowable average. Dust taken from different strata at the test locations showed greater amounts, but still within the allowed limits.

3610 APTIC NUMBER 13294

McKerrow, G. C.
A 14 X 32 FT. CONVERTER AT THE NORANDA SMELTER. In: Pyrometallurgical Processes in Nonferrous Metallurgy, J. M. Anderson and P. E. Queneau (eds.), Metallurgical Society Conferences vol. 39, Am. Inst. Mining, Metallurgical, and

Petroleum Engrs., 1967, p. 247-258. (Symposium sponsored by the Extractive Metallurgy Div. of the Am. Inst. Mining, Metallurgical, and Petroleum Engrs., Pittsburgh, Pa., Nov. 29-Dec. 1, 1965).

Construction of a new 14 ft converter at Noranda Mines Ltd. to increase copper production was started after reviewing the possibilities of the use of O2-enriched air, adding a sixth converter, and replacing the 12 X 30 ft converter with a larger one. The new converter is equipped with a water-cooled hood and breeching to avoid fusing the flue dust. Water circulates in a closed circuit between the water jackets and a heat exchanger which maintains the water temperature between 90 and 120 F. The area of the water jackets is 550 sq ft and an average of 120,000 Btu/min are removed from the gases while the converter is blowing. Better fitting of the hood and breeching have reduced the volume of converter gas going to the cottrells below the level from the 12 ft converter. Flux is fed through the hood, since the normally-employed Garr guns could not feed flux fast enough. Fifty automatic punchers, in two banks of 25 each, are sequentially fired, with a 20 to 30 sec interval between banks. The tuyeres are reamed manually at least once every 24 hrs. Air volume to the converter was initially 32,000 scfm with 8 psig at the blast valve. This dropped below 25,000 scfm at 15 psig after several days. Increasing the diam of the punch bars and reaming rods by 0.125 in. increased the volume to 28,000 to 30,000 cfm. The converter is initially charged with six 200 cu ft ladles of matte, 2 ladle skulls and 50 tons of flux. Four or five ladles of slag are skimmed and four more ladles of matte are charged after 75 min, with subsequent 2 ladle additions made. About three hours are required to finish a 140 ton charge of copper from white metal, giving a net production of 110 to 115 tons.

3611 APTIC NUMBER 13698

Mohrnheim, Anton F.
AIR POLLUTION AND THE METAL FINISHING INDUSTRY. Plating, March 1969.

The role of nitrogen oxides in air pollution is discussed in order to inform those who work with nitric acid and aqua regia of their capacity for creating or preventing air pollution. Nitrogen dioxide itself is toxic and, in addition, contributes to chemical smog production through a photochemical chain reaction. Even though the metal manufacturing and finishing industry uses larger quantities of nitric acid than the precious metal industry, the latter may release comparable amounts of nitrogen dioxide. This is demonstrated by the quantitative reaction of gold and nitric acid. In the precious metal industry, closed systems should be used with only stoichiometric amounts of aqua regia. For pickling and similar work in the metal manufacturing and finishing industry, mist collectors or air scrubbers should be used.

3612 APTIC NUMBER 13292

National Coal Assoc., Washington, D. C., Dept. of Economics and Transportation
STEAM-ELECTRIC PLANT FACTORS, 1960. Fuel consumption and costss, plant capacity, net generation, 1960, and programmed capacity, 1961-64. Washington, D.C., National Coal Assoc., 1961, 37p.

The steam-electric utility plants studied consumed 266.7 million tons of fuel, including oil and gas on a coal equivalent basis, in 1960. This consumption represented increases in the use of coal, oil, and gas of 6.0, 1.4, and 9.2%, respectively, over the previous year. A breakdown of fuel consumption for regions is given. Plant capacities, net generation, fuel consumption, and unit costs for steam-electric plants in 1960 are tabulated. Predicted capacities are give for steam-electric, hydroelectric, internal combustion, gas turbine, and nuclear plants programmed for or under construction in the period of 1961 to 1964. Trends in the efficiency of coal utilization at steam-electric plants for the period 1950 to 1959 are discussed and tabulated. Total fossil fuel usage in the U. S. during the 1951-1960 period increased from 149.5 million coal and equivalent tons to 266.7 million tons, or by 76.0%. Oil and gas usage increased 39.6 and 125.4% in the same period. Coal, oil, and gas represented 66, 8, and 26% of the utilities' total fossil fuel consumption in 1960. The average 'as burned' cost of coal, oil, and gas to the utilities in 1960 was 26.0, 34.5, and 23.8 cents per million Btu, respectively.

3613 APTIC NUMBER 13316

National Coal Assoc., Washington, D. C., Dept. of Economics and Transportation
STEAM-ELECTRIC PLANT FACTORS, 1964. FUEL CONSUMPTION AND COSTS, PLANT CAPACITY, NET GENERATION, 1964, AND PROGRAMMED CAPACITY, 1965-68. 1965, 47p.

The 895 steam-electric U. S. utility plants studied consumed 347.3 million tons of fuel, including oil and gas on a coal-equivalent basis, in 1964. This consumption represented increases in the use of coal, oil, and gas of 8.0, 10.1, and 7.3%, respectively, over the previous year. Fuel consumption by regions, and plant capacities, net generation, fuel consumption, and unit costs for steam-electric plants in 1964 are tabulated. Predicted capacities are given for steam-electric, hydroelectric, internal-combustion, gas-turbine, and nuclear plants programmed for, or under construction in, the period 1965-1968. Trends in the efficiency of coal utilization at steam-electric plants for the period 1954-1963 are discussed and tabulated. Total fossil fuel usage in the U. S. during the 1955-1964 period increased from 799.6 million coal and equivalent tons to 347.3 million tons, or by 74%. Oil and gas usage increased by 41.8 and 111.3% in the same period. Coal, oil, and gas represented 68, 9, and 23%, respectively, of the total fossil fuel consumption by utilities in 1955, and 65, 7, and 28% of the total in 1964. The average 'as burned' cost of coal to the utilities decreased from $6.07 per ton in 1955 to $5.89 in 1964. The cost per barrel of oil dropped from $2.14 to $2.06 and the cost of gas per

million cubic feet increased from 18.8 to 26.4 cents during the same period. The national average cost (1955-1964) per million Btu of coal and oil decreased by 0.6 cents, and gas increased by 7.3 cents. The cost of coal and oil fell 2.4 and 7.8%, respectively, over the period, with an increase in gas of 40.6%.

3614 APTIC NUMBER 13515

National Coal Association, Washington, D. C., Dept. of Economics and Transportation
STEAM-ELECTRIC PLANT FACTORS. (FUEL CONSUMPTION AND COSTS, PLANT CAPACITY, NET GENERATION, 1963, AND PROGRAMMED CAPACITY, 1964-67.). Aug. 1964. 47p.

The steam-electric utility plants studied consumed 320.7 million tons of fuel, including oil and gas on a coal equivalent basis, in 1963. This consumption represented increases in the use of coal, oil, and gas of 9.3, 2.7, and 7.3% respectively, over the previous year. A breakdown of fuel consumption by regions is given. Plant capacities, net generation, fuel consumption, and unit costs for steam-electric plants in 1963 are tabulated. Predicted capacities are given for steam-electric, hydroelectric, internal-combustion, gas-turbine, and nuclear plants programmed for or under construction in the period of 1964 to 1967. Trends in the efficiency of coal utilization at steam-electric plants for the period 1953-1962 are discussed and tabulated. Total fossil fuel usage in the U.S. during the 1954-1963 period increased from 175.8 million coal and equivalent tons to 320.7 millica tons, or by 82.4%. Oil and gas usage increased 41.7 and 92.7% in the same period. Coal, oil, and gas represented 65, 9, and 26% respectively, of the utilities' total fossil fuel consumption in 1954 and 65, 7, and 28% of the total in 1963. The average 'as burned' cost of coal to the utilities decreased from $6.31 per ton in 1954 to $6.02 in 1963. The cost per barrel of oil rose from $2.10 to $2.11 and the cost of gas per Mcf increased from 18.1 to 26.6 cents during the same period. The national average cost (1954-1963) per million btu of coal decreased by 1.1 cents, while oil and gas costs increased 0.7 and 8.6 cents, respectively. The cost of coal fell 4.2% over the period, with respective increases for oil and gas of 7.1 and 49.7%.

3615 APTIC NUMBER 13311

Nelson, Peter F.
IDENTIFICATION OF ACIDIC GROUPS IN EUCALYPT NEUTRAL SULPHITE AND PINE BISULPHITE PULPS. Svensk Papperstid., 71(9):369-372, May 1968. 7 refs.

Acids obtained from hydrolysis of eucalypt neutral sulfite semichemical and Pinus radiata bisulfite pulps were analyzed by chromatographic and spectrometric methods. The uronic acids of the two pulps resembled those obtained from three kraft pulps previously studied, but 4-O-methyliduronic acid was absent in the bisulfite pulp and occurred in relatively small amounts in the neutral sulfite pulp. The bisulfite pulp contained much larger quantities of aldonic acids than the neutral sulfite pulp, illustrating the importance of bisulfite ions in end-group oxidation of polysaccharides. Only traces of gluconetasaccharinic acids were present in the neutral sulfite pulp, indicating that 'peeling reactions' are less important in neutral sulfite than in kraft pulping. (Author abstract modified)

3616 APTIC NUMBER 12641

H. A. Newnham
METALLIC LEAD PRIMERS. A REVIEW. Paint Technol., 32(10):16, 18-20, Oct. 1968. 31 Refs.

The earliest reference to the rust inhibiting properties of metallic lead primers was made by J. N. Tervet in 1924. The literature relating to the exposure characteristics of metallic lead priming paints and the underlying chemical mechanisms of these primers is reviewed.##

3617 APTIC NUMBER 13088

Mukada, A., H. Ogata, S. Akashi, T. Mori, and A. Matsuda
DUST EMISSION IN THE ELECTRIC ARCWELDING. (Yosetsuji ni hisan suru funjin ni tsuite). Text in Japanese. Kuti Seijo (Clean Air-J. Japan Air Cleaning Assoc., Tokyo), 6(7):34-35, 1969.

To prove the hypothesis that an abrupt rise in temperature acts as a destructive inner stress to the coating materials in the welding process, causing them to emit fine dust at relatively low temperature, the coating materials were heated from room temperature to 1000 C while their weights were simultaneously measured with a thermal balance. The dust emission took place in three steps: low temperature (under 300 C), relatively low temperature (450 to 670 C), and high temperature (over 1000 C). Investigations showed that dust emission at the low temperature is caused by the vapor pressure of water within the materials. The dusts emitted at relatively low temperature were due to the fall of glutinosity of materials or to the thermal expansion of mineral components. The dust discharge at the high temperature, which was seen only in the case of the low hydrogen-type electrode, was caused by the acceleration of fluidity by CaF2 in the material. The chief mineral component of emitted dusts was magnetite, although quartz or talc were found in the dusts from some coating materials. Dust control methods suggested include the use of dried electrodes, which will stand against the dusts originating from evaporative pressure change in the materials, a heat treatment for the suppression of thermal expansion of the mineral components, and the development of new astringent bond materials to prevent the fall of glutinosity of the coating materials. (Author abstract modified)

3618 APTIC NUMBER 12643

GAS PROVING LOW-POLLUTION AUTO FUEL. Oil Gas J., 66(49):47-8, Dec. 2, 1968.

A dual fuel, gas-gasoline, system has proven successful in vehicles tested by the Pacific Lightning System. Natural

gas flowing from pressurized vessels is used under conditions in which conventional motor vehicles are most apt to be pollution offenders-moderate or uneven speeds in heavy traffic or congested areas. A flick of a dashboard switch converts the operation to gasoline for travel beyond the range of the stored gas. No significant engine modification is needed for the system. San Diego Gas & Electric Co. which has tested LNG as an auto fuel for 2 years, claims that hydrocarbon emissions are substantially lower than the emissions from the average gasoline-powered car equipped with smog-control devices-93 ppm after 42,000 mi compared with an average of 240 ppm. Carbon monoxide emissions were 0.21% compared with 1.2%.##

3619 APTIC NUMBER 13769

Perin, G., L. Diana, G. Rausa, and A. Barconi
A RESEARCH ON THE ATMOSPHERIC POLLUTION CAUSED BY A RAYON INDUSTRY. (L'Inquinamento atmosferico provocato da uno stabilimento per la lavorazione della viscosa). Text in Italian. Igiene Mod. (Parma), 61(9-10):606-622, Sept.-Oct. 1968. 17 refs.

The results of an investigation of atmospheric pollution by sulfhydric acid, carbon disulfide, and methylmercaptan, caused by a rayon industry, are reported. Concentrations of H2S up to 3.177 ppm, CS2 up to 0.0093 ppm, and CH3SH up to 0.064 ppm were found. (Author summary modified)

3620 APTIC NUMBER 12541

Perry, H., J. McGee, and D. Strimbeck
ELECTRICITY FROM COAL. THE CYCLES. PART 2. Mech. Eng., 90(12):44-47, Dec. 1968.

Supercharged boiler combined-cycle plants can be operated in various ways with differing problems of cooling water and dust collection. Operation with all power generated by the steam plant with the gas turbine generating only enough power to drive the supercharging compressor would take place at a turbine inlet temperature of 800 deg. F, a temperature that permits the use of an electrostatic precipitator and SO2-removal equipment. On the other hand, operation of this cycle so that 15 to 20% of the plant output is from the turbine, would raise the inlet temperature to 1500 to 1600 deg. F making it necessary to find other means of dust and SO2 removal. One of the proposed methods would be the use of a two-state combustion cycle. A closed cycle gas turbine which shows promise as a topping unit for the steam cycle is also discussed. An engineering and cost study is needed to evaluate the merits of the combined system.##

3621 APTIC NUMBER 13832

Pope, Evans and Robbins, New York
COAL-FIRED HEATING PLANT PACKAGE: PHASE II REPORT. OCR Contract 14-01-0001-242, 63p., Nov. 1, 1963.

CFSTI: PB 181-585

A complete steam generating package consisting of a bellied-in header innovation of an 'A' type boiler with a drawer type, single feed spreader stoker, forced draft fan, ash reinjection/over-fire air system, and combustion feed and control has been devised as the ideal combination for a packaged coal-fired boiler. The design provides for a specially designed dust-collector induced draft fan, and optional economizer, package to be field installed as a single unit on top of the boiler drum. Automation is achieved to the extent that only one man is required for normal operation of the plant. Boilers, coal, and ash handling systems operate on a fully automatic basis. The use of a continuous dual-purpose drag chain is an integral part of the design, the upper run of the chain delivering coal to all boiler hoppers and the lower run removing the ashes simultaneously. Considerable savings in erection costs have been achieved by extensive packaging of plant auxiliary and construction components. If a comparison is made with recent boiler plant construction costs, it can be seen that this type of boiler plant can be erected for a fraction of the cost of a traditional field-erected plant. (Author summary modified)

3622 APTIC NUMBER 13703

Potenkin, P. S.
LIMITING DUST EMISSION FROM ROTARY KILNS. Refractories (USSR) (English translation from Russian of: Ogneupory), no. 9-10:627-629, Sept.-Oct. 1968. 3 refs.

The chief factor affecting dust emission from a rotary kiln during calcination of raw materials is the velocity of the gases in the kiln and the cooler. The aerodynamics of dust emission are determined by an equation governing the motion of spherical particles in a current of gases, when the forces of the static head acting on the particle and its weight are in equilibrium. For nonstationary processes, the aerodynamics of dust-gas atmospheres in rotary kilns may be expressed analytically with certain reservations: the maximum size of the dust emitted is governed by the hydraulic cycle in the preparation zone; the kinetics of dust formation in the firing zone do not affect the aerodynamics of the process in the preparation zone; and the suspended particles of material move rectilinearly and do not effect one another. Calculations based on derived formulae showed that the working cycle of a rotary kiln firing raw materials is classed as turbulent, in which the maximum diameter of the dust emitted depends linearly on the velocity of the gases. In the case of forced operation of the kiln, the cycle will approximate the self-modelling region, and dust emission will increase substantially. Further investigation is required to establish the optimum levels of dust emission for different raw materials, and for provision for dust return to the kiln under favorable economic conditions.

3623 APTIC NUMBER 12636

THE PLANS ARE SET FOR BUSES TO RUN ON STEAM. Prod. Eng., 40(2):90-91, Jan. 27, 1969.

Plans are being made to operate four smog-free, steam engine buses in the San Francisco Bay area nex t year. At a total project cost of $610,000 the steam bus project is to be supervised by the California Assembly and operated through a contract with a non-profit research firm, which will take bids for engines and contract with technicians to run tests.##

3624 APTIC NUMBER 13815

Reid, J. H.
OPERATION OF A 350 TON PER DAY SUSPENSION ROASTER AT TRAIL, BRITISH COLUMBIA. In: Pyrometallurgical Processes in Nonferrous Metallurgy, J. M. Anderson and P. E. Queneau (eds.), Metallurgical Society Conferences, vol. 39, Am. Inst. Mining, Metallurgical, and Petroleum Engr., p. 69-77, 1967. 2 refs. (Based on a Symposium sponsored by the Extractive Metallurgy Div. of the Metallurgical Soc., Am. Inst. Mining, Metallurgical, and Petroleum Engr., Pittsburgh, Pa., Nov. 29-Dec. 1, 1965.)

Prior to the construction of a 350 ton per day suspension roaster, the roasting facilities at Trail consisted of eight suspension roasters, with individual capacities of 150 tons of zinc concentrates per day. Required auxiliary facilities included a wet concentrate conveying system, a dry concentrate conveying and grinding system, waste heat boilers, and a dust recovery system comprising cyclones and an electrostatic precipitator. With the exception of the wet concentrate conveying system, the new installation is completely independent of the older facilities. Its main components are a dry concentrate ball mill, the roaster proper, a calcine ball mill, a calcine slurry tank, waste heat boiler, cyclones, and glass fabric bag house. Most of the related equipment is installed in duplicate on opposite sides of the roaster. Operation at rated capacity requires the use of all equipment; operation at 60% capacity is possible with only one half of it. Sulfur dioxide is recovered economically by means of gas recirculation. The recirculating combustion gases are cooled in passing through the waste heat boiler and cleaned in the bag house, whose operation is completely automated. Dust loss with the glass fabric bag house is on the order of 174 lbs a day, representing a recovery of 99% of the dust load entering the bag house.

3625 APTIC NUMBER 13508

Benzoni, L. S., H. C. McQuire, and W. V. Barker
DIRECT ELECTROREFINING OF NICKEL MATTE. J. Metals, 10(6):414-418, June 1958. 10 refs.

International Nickel Company announces a new electrorefining process which recovers high-purity S, Se, and Co. Laboratory tests showed that S content of the anodes should exceed 23% for satisfactory performance. At S contents over 25%, the anodes corrode at a cell voltage of 2.3 v to produce an anode sludge containing about 97% elemental S. Anodes of below 20% S content corrode as a metal anode at a cell voltage of 1.7 v to produce a hard sludge containing only 50% elemental S. S recovery by volatilization, solvent extraction, or filtration leaves a residue containing uncorroded sulfides and the precious metals. The ratio of concentration of precious metals is about 125 to 1, as compared to about 20 to 1 for metal anodes. In the production of electrolytic Co, the Co dissolved from the anodes is precipitated from the nickel electrolyte by selective oxidation with chlorine, followed by hydrolysis to cobaltic hydroxide. The hydroxide is calcined to oxide which can be marketed as such or treated further for the production of electrolytic Co. The S filtrate from molten sludge from secondary anodes contains about 0.15% Se. The Se is separated from the S in a S distillation plant where it is concentrated in the reboiler to about 20% and tapped periodically into a cooling tank where the temperature is lowered to about 275 F.

3626 APTIC NUMBER 13668

Robb, E. W., W. H. Johnson, J. J. Westbrook, and H. B. Seligman
MODEL PYROLYSIS - THE STUDY OF CELLULOSE. Beitr. Tabakforsch., 3(9):597-604, Dec. 1966. 4 refs.

Relating smoke products to smoke precursors is an ambiguous task when burning any naturally occurring plant. To facilitate interpretation, a simple model pyrolysis system was studied using cellulose as the smoke precursor and monitoring benzo(a)pyrene as the smoke product. Data obtained show how pyrolysis was affected by changes in atmospheres, varied pyrolysis temperatures, the addition of inorganic materials, and chemical modifications of the cellulose molecule. It is hypothesized that cellulose can undergo pyrolysis by two different modes to form benzo(a)pyrene. Large quantities of the hydrocarbon can be formed by high-temperature (850 C) isothermal pyrolysis of cellulose via an efficient gaseous reaction route. In this reaction, the benzo(a)pyrene yield decreased in the presence of iron, cobalt, and nickel, while the yield increased with increasing temperatures and with the introduction of oxygen into the system. In contrast, graduated heating experiments demonstrated that benzo(a)pyrene began to form at 450 C. This reaction was inefficient with respect to benzo(a)pyrene yield and was unaffected by the presence of metals. The benzo(a)pyrene precursors appeared to be nonvolatile, being formed from the solid decomposition of cellulose. This reaction was inhibited by nitric oxide or salts generating nitric oxide. Additionally, oxidation of the cellulose molecule at the C6 position produced a decreased benzo(a)pyrene yield. (Author summary modified)

3627 APTIC NUMBER 13389

Robinson, John W.
MILL EXPERIENCE WITH THE R-2 CHLORINE DIOXIDE PROCESS. Tappi, 46(2):120-123, Feb. 1963. 4 refs. (Presented at the 16th

Alkaline Pulping Conference, Tech. Assoc. of the Pulp and Paper Industry, Savannah, Ga., Oct. 31 to Nov. 2, 1962).

Experience in design, startup, and operation of the first mill installation of the R-2 chlorine dioxide process is discussed. Typical operating data, raw material consumption, and recommended optimum operating conditions are included. Results of the first year's operation (1962) indicate approximate savings over the previously existing process of $0.08 per lb of chlorine dioxide produced. The R-2 process is relatively trouble free and is very easy to operate and control during startup, as well as during changes in production rate. (Author abstract modified)

3628 APTIC NUMBER 13874

Bunion, T. C. and E. R. Johnson
REPROCESSING CONSERVES FUEL, ENHANCES NUCLEAR ECONOMICS.
Electrical World, p. 95-97, June 12, 1967.

Though reprocessing achieves high utilization of uranium resources and enhances the economics of nuclear power generation, standard A67 charges for reprocessing fuels of the Yankee or Dresden type are currently about $32,000 per metric ton of uranium (MTU) or 12% of the fuel-cycle for any reactor operating under equilibrium conditions. Lower charges and reasonable profits should be attained by increasing the throughput per dollar of capital and recovering such isotopes as neptunium, cesium, strontium, cerium, and americium. The Nuclear Fuel Service's spent fuel projection indicates that a 1 MTU/day plant can handle the entire U. S. commercial reprocessing load through 1972. An additional 5 MTU/day plant will not be required before 1977. A Purex process using a mechanical decladding technique has been developed to separate plutonium and uranium from radioactive fission products. Spent fuel must be transported to the reprocessing plant in shielded iron casks, and shipping costs are high. Within the U. S., transportation services may range from $4,000 to $10,000 per MTU. Because costs are based on total weight, cask design should minimize the weight per MTU shipped.

3629 APTIC NUMBER 12967

Saito, Takeshi
INFLUENCE OF FUEL TYPES OF COMPOSITION OF AUTOMOTIVE ENGINE EXHAUST. (Jidosha haiki gasu ni oyobosu nenryo sosei no eikyo). Text in Japanese. Nenryo Kyokai Shi (J. Fuel Soc. Japan), 48(3): 148-159, 1969. 8 refs.

A continuation of the investigation of the influence of different fuels on the composition of automotive engine exhaust constituents is reported. The relations between the olefin content of fuel and exhaust constituents are experimentally shown using an internal combustion engine on a dynamometer block. Test fuels included two gasolines of different olefin content, commercial LPG, and pure propane. Carbon monoxide, hydrocarbons, N2, O2, CO2, H2, and nitrogen oxides were analyzed by gas chromatography. Unsaturated olefins were detected with an absorber reported by W. B. Innes. A special sampling apparatus using a magnetic bulb was constructed for analysis under acceleration. A hydrogen flame ionization detector was used for hydrocarbon analysis; molecular sieve and active charcoal were used for inorganic analyses; phenol disulfonic acid was used for nitrogen oxide determinations. Analytical data are shown for various engine loads and speeds. It is concluded that CO concentration depends on air-fuel ratio only and is not influenced by fuel composition. Differences in total hydrocarbon content of exhausts from different fuels are quantitatively small, but unsaturated hydrocarbons, which contribute to air pollution reactions, increase slightly with the fuel olefins.

3630 APTIC NUMBER 12989

Simons, Wilhelm
EMISSION MEASUREMENTS AT SMALL INCINERATORS. (Emissionsmessungen an kleinen Mullverbrennungsanlagen). Text in German. Tech. Ueberwach. (Duesseldorf), 7(12):413-415, Dec. 1966. 3 refs.

The new law of September 8, 1964 to prevent air pollution requires that plants with a capacity of less than 20 tons per day emit not more than 200 mg dust referred to 1 cu m moist waste gas and a CO2 content of 7%. The smoke plume may not exceed the No. 2 gray shade on Ringelmann's scale. Moreover, the law stipulates that all incinerators be equipped with auxiliary burners, since all solid components must be burned completely. Measurements are required to prove compliance with the law. Up to now a total of 220 measurements had been taken at 49 small incinerators of 10 various manufacturers. All incinerators had an afterburner and usually two auxiliary burners in the main combustion chamber. Domestic wastes, paper, and hospital wastes were ashed. Of the 49 incinerators, 38 were equipped with dust separators. Results of the measurements show that 75% of the incinerators emitted dust concentrations below the tolerance limit. The good results for those incinerators without dust separators can be explained by the fact that favorable combustion conditions were maintained. Furthermore, these furnaces burned only domestic wastes and paper. A study of the relationship between the various types of wastes fired in the furnaces and dust emission showed that they have but little effect on keeping the dust emissions below the tolerance limit. The percentage of furnaces which do not exceed the tolerance limit increases from 72 to 86% with increasing volume of the combustion chamber. Measurements of the temperatures during the combustion process showed that all were above 800 C at the peak of the combustion, after which they fell to 700 C. No disagreeable odors were noticed. The CO2 concentrations measured ranged from 1.7 to 7.0%. Thus, it can be safely concluded that these small incinerators pose no danger to their surroundings.

3631 APTIC NUMBER 13066

Stacie, James H. and Robert G. Guide

SULFIDITY CONTROL BY THE ADDITION OF MOLTEN SULFUR TO KRAFT WHITE LIQUOR. TAPPI, 46(2):141-144, Feb. 1963. 8 refs.

In the kraft pulping industry, the major sulfur losses occur at the multiple-effect evaporators, lime kilns, recovery furnaces, and digesters. Several methods are available to reduce these losses, including the oxidation of weak black liquor, scrubbing of furnace flue gases, and collection and combustion of the digester blow and relief gases. However, most of these methods suffer from high capital costs which cannot be paid off quickly enough by chemical savings. A system for sulfidity control has been developed in which molten sulfur is continuously and automatically added to white liquor at temperatures above 300 F. The initial products of the reaction are sodium polysulfides, which decompose, yielding 2 moles of sodium sulfide and 1 mole of sodium thiosulfate. These products can be used directly in the digesters and are readily recovered in the black liquor recovery cycle. It is believed that the increased sulfidity of the white liquor has improved the overall strength qualities of the pulp. In contrast to most other sulfur addition systems, this system is automatic, readily adjustable, and free from the hazards of sulfur dust. Significant sulfur losses still occur, however, due to H2S stripping in the cascade evaporators. This loss is a result of increased sulfidity in the black liquor, increased pulp mill production, and low black liquor oxidation efficiency. A new oxidizer, of better design and higher capacity, is being built, and it is believed that these losses will be eliminated.

3632 APTIC NUMBER 13785

Teitelbaum, Perry D.
ENERGY PRODUCTION AND CONSUMPTION IN THE UNITED STATES: AN ANALYTICAL STUDY BASED ON 1954 DATA. Washington, D. C., Dept. of the Interior, Bureau of Mines, Report of investigations, 5821, 145p , 1961. 23 refs.

All available statistical data on energy production, transformation, and use for 1954 were collated and analyzed in detail to improve the understanding of the economics of energy production and consumption. Main topics are: the pattern of energy flows in 1954; notes and comments on the scope and adequacy of energy statistics; and energy origin and disposition in 1954 and other years. Numerous tables are presented throughout text in six appendices. The study presents an energy balance sheet for the U. S. in 1954, and includes data and discussion of all forms of coal, gas, oil, wood, and hydroelectric power.

3633 APTIC NUMBER 12637

W. Teske
EMISSIONS AND ABATEMENT OF OXIDES OF NITROGEN IN NITRIC ACID MANUFACTURE. Chem. Eng., No. 221, CE263-266, Sept. 1968.

The emission problem in the manufacture of nitric acid results from incomplete conversion of nitrous oxide to nitric acid. Some of the processes for reducing the emissions which are discussed briefly include: Alkaline absorption with milk of lime or aqueous ammonia; oxidation with hydrogen peroxide or ozone; absorption in an aqueous solution of magnesium oxide; removal as nitrosylsulfuric acid by treatment with a sulfuric acid, nitric acid mixture; and catalytic reduction processes.##

3634 APTIC NUMBER 13330

Unterberger, O. G. and M. S. Gofman
DUST FORMATION DURING IMPACT IN HAMMER CRUSHERS. Coke Chem. (USSR) (English transl.), No. 11:44-48, 1968. 3 refs.

A mathematical analysis of the dust yield obtained from raw coal mixtures crushed in hammer crushers is presented. Tests performed with a laboratory-sized hammer crusher gave results that were in close agreement with the theoretical approach. Two fundamentally different factors of dust formation in hammer crushers were found: (1) free-impact dust formation, and (2) dust formation resulting from abrasion as groups of particles slid across the working face of the hammer. The amount of dust formed by abrasion depended on the amount of dust in the starting mixture, and that formed by free impact was proportional to the linear speed of the hammers.

3635 APTIC NUMBER 13855

Violet, P., A. Aynard, and G. Dumarchey
CHECK ON THE OPERATION OF COMMUNAL CENTRAL HEATING BOILERS IN LYONS DURING WINTER 1967-1968. (Controle du fonctionnement de chaudieres de chauffage central collectif a Lyon pendant l'hiver 1967-1968). Text in French. Pollut. Atmos. (Paris), 11(41):15-19, Jan./March 1969.

The Lyons Health Office, working in collaboration with technicians of the Association Lyonnaise des Proprietaires de Machines a Vapeur et Electriques and with financial assistance of the Centre Interprofessionel et Technique d'Etudes de la Pollution Atmospherique, carried out inspections, during the winter of 1967/1968 on 44 boilers whose calorific capacities ranged from 170 therm/hr to 5015 therm/hr. Thirty-nine units burned fuel oil and five coke or coal. In 97% of the cases, the Bacharach index was below 6. In 91% of the cases, the temperature of the smoke was below 300 C, with CO2 exceeding 9% for 44% of the operations checked. Forty-seven boilers, ranging from 50 to 1250 therm/hr, already checked in 1966/1967, were again inspected. A slight improvement was noted with regard to combustion. (Author abstract modified)

3636 APTIC NUMBER 13261

Voronov, P. D., I. A. Taldykin, B. L. Markov, V. G. Antipin, and V. F. Bogatenkov
DUST FORMATION IN A TWO BATH STEEL FURNACE. (Pyleobrazovaniye v dvukhvannoy staleplavil'noy pechi). Text in Russian. Izv.

Tyazhkh Ucheb. Zavedenii Chernaya Met., no. 8:62-68, 1968. 2 refs.

Tests carried out on a 215 ton martensite furnace revealed that tuyere placement plays the greatest role in the production of lignite smoke, a major constituent of exhaust dust. During furnace operation without oxygen scavenging, the dust content of exhaust gases during filling, melting, and melt removal is 2.1, 1.8, and 1.3 g/cu m, respectively. Dust samples in this case contained 70-90% iron oxides, pointing to the metal bath as the main dust source, the presence of other metal oxides indicating slag and refractory materials as additional sources.

3637 APTIC NUMBER 13063

Whitney, R. P., S. T. Han, R. B. Kenler, and J. P. Bakken
BISULFITE METHOD OF CHEMICAL RECOVERY. Tappi, 48(1):1-6, Jan. 1965. 7 refs.

The direct sulfitation of a smelt solution by SO2 for neutral sodium-base sulfite recovery has been adopted by several mills. However, two disadvantages to this method are a large load of thiosulfate in the liquor, and a very heavy loss of sulfur to the atmosphere. An improved version of sulfitation by using a bisulfite-sulfite solution has been developed. Under the best conditions, the bisulfite method can produce a pulping liquor containing only 2 mole % of thiosulfate. It also has the advantage of simple sulfur recovery. In this method, a smelt solution is mixed with a bisulfite-sulfite solution and sprayed into a chamber at the boiling temperature. The reacted liquor flows downward through a packed column countercurrent to a rising stream of steam. Hydrogen sulfide and CO2 generated by the reactions are flashed, stripped, and removed as sour gas. A part of the reacted liquor is used to prepare the bisulfite solution by absorption of SO2 from a burner gas. The sour gas, after partial condensation, is burned in a sulfur burner to form SO2, thus completing the sulfitation cycle. (Author abstract modified)

3638 APTIC NUMBER 13631

Wiedmann, Ludwig
FLUE GAS CHIMNEYS-DESIGN CALCULATIONS AND USE FOR SIMULTANEOUS REMOVAL OF WASTE AIR. (Abgasschornsteine- ihre Berechnung und Verwendung bei gleichzeitiger Abluftabfuehrung.) Text in German. Gas Wasserfach (Munich), 109(21):565-572, May 24, 1968. 4 refs.

A review of chimney design criteria from the point of view of draft efficiency is followed by results of computations using a set of eight engineering formulas specifying the interrelations between chimney parameters and the inlet and outlet state of the flue gas. These results are represented in a set of six graphs and are discussed at length.

3639 APTIC NUMBER 12557

Wood, F. A.
SOURCES OF PLANT-PATHOGENIC AIR POLLUTANTS. Phytopathology, 58(8):1075-1084, Aug. 1968. 27 refs.

Sulfur dioxide, fluoride, ozone, and peroxyacetyl nitrate are currently the most important plant-pathogenic air pollutants in the USA. These or their precursors emanate from transportation, industry, or generation of electricity. The increase in population and in our demands for energy will result in increased activity within each of these categories and attendant increases in pollutant emissions. Thus, in all instances, the problem is going to worsen within the next 20 years. By 2000 AD or shortly thereafter, there should be a reduction in the levels of SO2 to present levels; the fluoride pollution problem will probably be worse; and, unless a power plant such as the electric engine is developed to take the place of the gasoline engine, our major problem will probably be one of photochemical air pollutants. It is also quite likely that pollutants such as hydrogen chloride and chlorine will increase in importance in the future. Finally, it should be kept in mind that the accuracy of predictions of this type is subject to changes in attitudes and technology. (Author's summary)##

3640 APTIC NUMBER 13116

Woodward, Mitchell J.
FOUR-CYCLE INTERNAL COMBUSTION ENGINE. (Assignee not given.) U. S. Pat. 3,446,192. 5p., May 27, 1969. 10 refs. (Appl. Sept. 5, 1967, 7 claims).

A four-cycle internal combustion engine is designed to operate with greater efficiency than existing four-cycle engines and to discharge a minimum of unspent fuel and combustion products into the air. Like other models, it has numerous first pistons mounted in cyclinder openings in a cylinder block containing the crankshaft that drives them. It is distinguished from previous inventions by the numerous firing chambers placed adjacent to the cyclinder openings, each chamber containing a reciprocal second piston. The first and second pistons cooperate to provide not only firing spaces of predetermined magnitude, but to discharge all products of combustion and partially burned fuel from each pair of cyclinder openings and firing chambers. Each time a crankshaft-driven piston completes a firing cycle, the second piston with which it is associated reciprocates the length of the firing chamber to discharge all combustion products through exhaust ports. Thus, fuel that is sequentially fired into the associate cyclinder opening is not contaminated with combustion products or partially burned fuel from the previous firing.

3641 APTIC NUMBER 13027

Wright, Fred D.
ROCK MECHANICS AND COAL MINING. Mining Engineering, 21(2):112-113, Feb. 1969. 34 refs.

Research by a number of investigators on mine pillars, longwall mining, and roof support is discussed. Morino (U.S.B.M., R.I. 7155, July 1968) tested approximately 400 model pillars of limestone, sandstone, and granite in uniaxial compression to determine the effect of planes of weakness and their inclination on pillar strength. Results indicated that strength decreases rapidly as the angle from the horizontal to the plane of weakness increases from 30 to 57 deg. and that the number of planes has only a minor effect on strength. A project to determine the mechanism of brittle fracture of rock and to determine the effect of specimen size on the compressive strength of coal concluded that the width to height ratio did affect pillar strength, but only up to a point. Select U.S. and British mines are discussed as examples for and against longwall mining. One case describes severe bouncing which ceased when the room and pillar system was replaced by a longwall system. Production capacity is analyzed for both systems. Beam and pressure arch theories correlated to field experience by Adler (Mining Congr. J., p.58-67, March 1968) are reviewed. The roof-control program of the North American Coal Company lead to improvements in setting timbering and bolting standards, in bolt recovery, and in faster and simplified bolting methods. The Bureau of Mines' work in hydraulic mining and detonation complications was also mentioned.

3642 APTIC NUMBER 12975

Yamada, Go
CORROSION ATTACK OF BOILERS BURNING HEAVY-OIL. (Juyu boiler no fushoku shogai). Text in Japanese. Netsu Kanri (Heat Engineering, Tokyo), 21(3):2-9, March 1969. 5 refs.

Sulfur trioxide is a major cause of corrosion in boilers burning heavy oil. Sulfur compounds in heavy oil are oxidized to SO2 and SO3 during combustion. Sulfur trioxide combines with water vapor to form sulfuric acid, which corrodes surfaces at temperatures below the acid dewpoint of flue gas. Maximum corrosion occurs at 30-40 C lower than acid dewpoint. Meanwhile, on high temperature surfaces, alkali metal sulfates, formed from inorganic compounds, sulfur oxides, and oxides of vanadium accumulate, impede thermal condition, and cause corrosion. Sulfur trioxide is considered to be formed by (1) the reaction between SO2 and O2 in the vapor phase, (2) the oxidation of SO2 in flame, and (3) the contact oxidation of SO2 on metallic surfaces. Calculating the conversion rate of SO2 to SO3 at equilibrium in (1), the greater the O2 and the lower the temperature, the larger the rate becomes. However, equilibrium does not occur in boilers, so the actual conversion rate is 1 to 4%. In (2), the greater the amount of sulfur included in the oil and the hotter the flame, the greater the amount of SO3 formed. These findings suggest that combustion with low excess O2 can reduce corrosion. Low-temperature corrosion can additionally be controlled by additives, such as ammonia, magnesium and calcium compounds; high temperature corrosion by carbonates, hydroxides, and oxides of alkaline earth metals.

3643 APTIC NUMBER 13163

CONTROLLING ATMOSPHERIC POLLUTION. (Il controllo dell'inquinamento atmosferico). Text in Italian. Acqua Ind., 11(3):13-15, May 1969.

At a meeting organized by the Institution of Mechanical Engineers, the air pollution control systems adopted by several industries were reviewed. Electrostatic filters are used to eliminate burned particles emitted by steam plants. These filters reach a 99% efficiency. Fertilizer factories usually adopt conventional systems. The air pollution caused by oil refineries must be considered according to its two sources: naphtha combustion and combustibles evaporation. For the first source, geometric scaling of chimney is widely used. The evaporation of combustibles is controlled either by reducing the space between the fuel level and the tank roof or by circulating the gases from the top of the tank to a scrubbing tower containing sodium hydroxide. A method for reducing air pollution by fiberglass factories is based upon scrubbing the air containing phenols in a three section column. Gases exhausted by vulcanization furnaces are burned in a catalytic combustion process.

3644 APTIC NUMBER 12651

Anon.
AIR POLLUTION CONTROL EQUIPMENT BUYERS' GUIDE. Air Eng., 10(12):27-42, Dec. 1968.

This buyers' guide for air pollution control equipment gives a listing by category and product and an alphabetical listing of manufacturers with complete name and address of the supplier.

3645 APTIC NUMBER 13164

Alfano, Gaetano, Vittorio Betta, and Francesco Beale
ON RESEARCH ON AIR FILTRATION. (Su alcune ricerche nel campo della filtrazione dell'aria). Text in Italian. Condizionamento dell'aria Riscaldamento, Refrigerazione, 13(1):23-31, Jan. 1969. 7 refs.

There are many methods for testing the efficiency of air filtering apparatus. The ASHVE Code Test is the oldest, having been adopted in 1933. In 1953, the Air Filter Institute issued the Code for Testing Air Cleaning Devices Used in General Ventilation, which was revised in 1953. Among calorimetric methods, the AFI Dust Spot Test Code was issued in 1960. It tests filter efficiency photometrically. The DOP Test is a special system that uses a liquid organic compound. The Methylene Blue method tests absolute filters. The Sodium Flame Test is based upon the yellowing of a hydrogen flame in the presence of sodium. Experimental equipment has been set up recently in Naples which is a variation of the AFI Dust Spot system. The theory of air filtration is not yet adequately developed, especially with regard to the quantitative aspect of the phenomenon. In fact, all the methods devised so far to solve this problem are limited by uncertain assumptions and by the great variability of factors affecting air filtration.

3646 APTIC NUMBER 13546

American Conference of Governmental Industrial Hygienists, Cincinnati, Ohio, Committee on Air Pollution
PROCESS FLOW SHEETS AND AIR POLLUTION CONTROLS. Cincinnati, American Conference of Governmental Industrial Hygienists, 1961, 40p. 33 refs.

A variety of industrial processes, described in the text and illustrated by flow charts, are categorized according to the odors or pollutants produced by each stage of plant operations. Appropriate primary and secondary air cleaning equipment, including dry centrifuges, wet scrubbers, and fabric and electrostatic filters, are matched to each operation and evaluated as satisfactory or not satisfactory. The suggested controls have applications for asphalt and cement plants, gray iron or malleable foundry operations, the milling of asbestos ores, alfalfa dehydrating plant operations, coffee processing, iron and steel making, and scavenger-type rendering processes. Suggested reference sources are included for each process.

3647 APTIC NUMBER 13893

Anderson, H. C., P. L. Romeo, and W. J. Green
A NEW FAMILY OF CATALYSTS FOR NITRIC ACID TAIL GASES. Nitrogen, no. 50:33-36, Nov./Dec. 1967. 6 refs.

A unitary ceramic cartridge was designed to act as a precious metal catalyst support. The support consists of a block of ceramic, through which a multitude of small parallel channels pass which are coated with the precious metal. Bench-scale and field experience have shown that the unitary catalyst is well-adapted to the treatment of nitric acid stack gases. Using natural gas as a fuel, decolorization of stack gases is effected using palladium as the catalyst on the ceramic support. The ceramic structure is well designed for the two-stage catalytic removal of NO and NO2 in gases containing more than the 3% maximum oxygen level required for one stage removal. By applying platinum-alumina on the ceramic cartridge, excellent abatement (94%) of the nitrogen oxides present in the gases is achieved at 100 psi and space velocities up to 150,000.

3648 APTIC NUMBER 13689

Atroshchenko, V. I., A. M. Tseytlin, A. P. Zasorin, and V. S. Zolotarev
UTILIZATION OF NITROGEN OXIDES - BY-PRODUCTS OF CERTAIN INDUSTRIES. (Utilizatsiya okislov azota - otkhodov nekotorykh proizvodstv). Text in Russian. Khim. Prom. (Moscow), 1(1):79-80, 1960.

Production of nitric acid from exhaust gas with high NO content as compared with exhaust gas with low NO content plus NO2 is discussed. A method is described which involves cooling the gases to 25-30 C, introducing additional air, and carrying out oxidation in a cooler-oxidizer. About 8% absorption is achieved with 35% nitric acid absorbent. Specifications for an operating installation which produces 2500 kg of 55% acid are given. A modified version using oxygen rather than air is mentioned.

3649 APTIC NUMBER 12797

Attig, R. C.
PILOT PLANT INVESTIGATION OF THE POTENTIAL OF DIRECT LIMESTONE-DOLOMITE ADDITIVE INJECTION FOR CONTROL OF SULFUR DIOXIDE FROM COMBUSTION FLUE GASES. Babcock and Wilcox Co., Alliance, Ohio. Research Center, Contract PH-86-67-127, Rept. LR:68:4078-01:9 (ES-9477), (44) p., December 10, 1968.
CFSTI: PB 184 049

Pilot plant tests have been made to evaluate the effectiveness of raw, hydrated and calcined limestones and dolomites injected into the flue gases to reduce sulfur dioxide concentration. The effects of additive fineness, temperature of injection and injection rate were also investigated for selected additives. The influence of limestone and dolomite on fly ash strength and on coal ash slag viscosity and fusion temperatures has been determined to evaluate the effect on ash deposition on furnace walls and in tube banks. The influence of additives on the ash collection properties as determined by bulk and in situ resistivity measurements has also been determined. Raw additives were most effective at Port 1 which is approximately 2300 F. Hydrates were somewhat more effective than the raw stones at Port 1, and effectiveness did not decrease when they were injected into lower gas temperatures. The hydrates as a class had greater specific surface areas than the raw limestone prepared in the normal manner. This was believed to be one factor affecting their effectivenss, and tests with the raw additives indicated that increased fineness improved performance. The additives will have varying effects on ash deposition depending on the amount used and on the properties of the additive and coal ash. For the materials tested thus far, it is expected that large quantities of additive would decrease the extent of wall slagging and produce soft deposits under normal operating conditions. However, the great dust loading may place a burden on ash-handling and soot blowing equipment. Fly ash resistivity tests indicate that limestones and dolomites will make the fly ash more difficult to collect.

3650 APTIC NUMBER 12963

Bag Filter Committee Japan Air Cleaning Association
THE SCIENCE AND TECHNOLOGY OF BAG FILTERS. (Bagu fuiruta no kagaku to gijutsu). Text in Japanese. Kuki Seijo (Clean Air-J. Japan Air Cleaning Assoc., Tokyo), 6(2):1-25, June 1968. 2 refs.

Bag filters have proven to be reliable mechanisms for air cleaning. Efficiencies of up to 99.9% are possible for particles in the micron range and up to 80% for 0.1 micron particles. Filters have been designed for dust concentrations between 0.007 and 30 g/cu m and can handle particle sizes from 0.1 to 200 microns. Volume flow rates between 30 and 20,000 cu m/min can be handled by nine different types of cyclones or electrostatic precipitators. Filter cleaning is usually accomplished by mechanical shaking, reverse air flow, ultrasonics, shocking, or a combination of these methods. The actual filtering in bag filters is accomplished by a fixed, thin layer of trapped dust. The 'sieving effect' is responsible for trapping particles greater than 25 microns, while inertial impaction and interception are the effective mechanisms in the 1 to 10 micron range. The combination of the resistances of the filter fabric and the trapped dust particles is termed the filter resistance and is a measure of the ease with which air or a gas can pass through the structure. Experimental work on the relationship between filter resistance and collection efficiency is reviewed. Sample design calculations for bag filters are given.

3651 APTIC NUMBER 13333

Barclay, H. G., S. Prahacs, and J. J. O. Gravel
THE AST RECOVERY PROCESS. PYROLYSIS OF CONCENTRATED NSSC LIQUORS. Pulp Paper Mag. Can., 65(11):T-553 to T-564, Dec. 1964. 15 refs. (Presented at the Annual Meeting of the Tech. Sect., Canadian Pulp and Paper Assoc., Montreal, Jan. 28-31, 1964).

The pyrolysis of concentrated spent sodium-base sulfite liquors was carried out in a pilot Atomized Suspension Technique (AST) reactor over a range of pressures, temperatures, feed rates, and feed concentrations. The yields and chemical compositions of the products were determined and correlated with the operating conditions. Experience with flash atomization of the feed was obtained for the first time and the incidence of wall deposits in the reactor was examined. At constant feed rate and reactor temperature, reactor pressure had little effect on the product yields and quality. Reactor temperature has a major effect on the degree of gasification of the organics and the conversion of sodium to carbonate. Gasification and conversion were virtually complete at 800 C and smaller feed rates. Operation at 750 C produced lower gasification but acceptable conversion over the range of flows tested. In all cases the heat available in the pyrolysis gases was in excess of the requirements of the reactor and thermal self-sufficiency is indicated at feed concentrations above 50%. Since the sodium sulfate content in the residue depends only on the operating conditions in the reactor, the danger of buildup in the closed system is eliminated. It is believed that conditions in any AST reactor could be adjusted to produce different combinations of the products reported. (Author summary modified)

3652 APTIC NUMBER 13555

Batchelor, James D., George P. Curran and Everett Gorin
PROCESS FOR MAINTAINING HIGH LEVEL OF ACTIVITY FOR SUPPORTED MANGANESE OXIDE ACCEPTORS FOR HYDROGEN SULFIDE. (Consolidation

Coal Company, Pittsburgh, Pa.) U. S. Pat. 2,950,230, 8p. Aug. 23, 1960. 4 refs. (Appl. Nov. 8, 1957, 11 claims.)

A process for removing sulfur from carbonaceous solid materials by treatment with hydrogen in the presence of manganese oxide acceptors for H2S is discussed. The carbonaceous fuels are mixed with a solid material which is able to absorb H2S. The mixture is treated with hydrogen gas which combines with the sulfur to form H2S. This is then absorbed by the manganese oxide acceptor. Following sufficient desulfurizing treatment of the fuels, they are separated from the acceptor and recovered as a low sulfur carbonaceous fuel product. The sulfided acceptor is regenerated by treatment with air to restore the manganese oxide. The sulfur removed from the fuels is rejected from the system in the form of SO2.

3653 APTIC NUMBER 12503

Battelle Memorial Inst., Richland, Wash.
APPLICABILITY OF ORGANIC LIQUIDS TO THE DEVELOPMENT OF NEW PROCESSES FOR REMOVING SULFUR DIOXIDE FROM FLUE GASES. (FINAL PHASE I.) Contract PH-22-63-19, (114)p., March 1969. 32 refs.
CFSTI: PB 183513

A study was undertaken, the purpose being to survey the literature and, on the basis of the findings, to assess the applicability of organic liquids to the development of new processes for removing SO2 from fossil fuel fired power plant stack gases. This litera tur search also extended to the process engineering field to indicate the preferred methods of contacting the sorbent with the flue gas and the preferred technique of sorbent regeneration and recovery of sulfur values. A preliminary assessment of the applicability of organic liquids for cleaning both smelter effluent and power plant flue gases were made, and conditions required to assure adequate effluent gas plume dispersion were reviewed. Economic factors important to the comparison of organic liquids as scrubbing agents were reviewed, along with other means of sulfur dioxide removal.

3654 APTIC NUMBER 12574

Baxter, W. A.
RECENT ELECTROSTATIC PRECIPITATOR EXPERIENCE WITH AMMONIA CONDITIONING OF POWER BOILER FLUE GASES. J. Air Pollution Assoc., 18(12):817-820, Dec. 1968. 9 ref.

Motivated by heightened recent interest, Koppers Co. has been experimenting with ammonia conditioning of power boiler flue gases for the purpose of improving the precipitability of the emitted fly ash. Chemical reactions resulting from NH3 injection are postulated. Measurements on three pulverized coal and two cyclone fired boilers, all os which emit acidic ash, are described. In all five cases, considerable but varying, increase in precipitator power input and collection efficiency resulted when gaseous NH3 in the amount of 15 ppm was injected between the economizer and air preheater. The conditioned fly ash showed decreased acidity and inconsistent change in electrical resistivity. Unless air heater temperatures were unusually high (greater than 400 deg F), tendency of the air heater to plug was an additional, but unwanted, result. At one station with high air heater outlet temperature NH3 injection has been adopted as a permanent solution to community pressure for reduction of stack discharge. NH3 injection downstream of the air heater produced no effect. Future plans are presented to continue the program beyond present results described in this interim report. Author's Abstract##

3655 APTIC NUMBER 13112

Beck, Horst
AIR POLLUTION PROBLEMS AT INCINERATORS WITH CAPACITIES UP TO 5 TONS/HR. (Probleme der Luftreinhaltung bei Abfallverbrennungsanlagen mit Durchsatzleistungen bis zu 5 t/h). Text in German. Energie Tech., 21(6):207-210, June 1969.

With the increasing use of incinerators for waste disposal, regulations concerning the emission have become stringent. Ver. Deut. Ing. standard 2301 (Feb. 1967) calls for a reduction of stack emission of particulate matter to 200 mg/cu m for moist flue gas (with a CO2 content of 7%) from incinerators with a capacity of less than 1.5 t/hr. Incinerators with a higher capacity are to be equipped with the most recent dust collectors. Efficient flue gas cleaning depends very much on the selection of a suitable cleaning facility. Many factors such as grate construction, size of the combustion chamber, capacity, composition of the waste material, heating value, excess air, and dust concentration of the dirty gas ought to be considered. If wet dust collectors are used, waste water purification facilities must be available. Cyclones and multiclones can be used presently only with incinerators whose flue gases carry low dust concentrations. The advantage of such dust collectors is their small size. Electrostatic precipitators are gaining increasing importance, particularly when operated in connection with a multiclone. But the newest and most suitable dust collectors for the present composition of flue gases are probably bag filters. Europe's most modern incinerator, erected in Berlin and inaugurated in 1968 (capacity of the plant is 750 kg/hr), has been equipped with such a facility after satisfactory results had been gained with a bag filter in Switzerland. Depending on the need, such filters can be equipped with silicon-treated glass fiber bags of tubular shape or with synthetic fiber bags. Periodically, the tubes are shaken to dislodge the dust and cause it to fall into the collecting hopper. Such filters separate dusts which are in the submicron range.

3656 APTIC NUMBER 12954

Benteler, Erich and Alfred Kretschmer
AFTERBURNER DEVICE FOR CATALYTIC COMBUSTION OF COMBUSTIBLE COMPONENTS IN THE EXHAUST GAS OF AN INTERNAL COMBUSTION ENGINE. (Benteler-Werke A.G., Bielefeld, Germany) U. S. Pat. 3,445,195. 13 p., May 20, 1969. 7 refs. (Appl. Mar. 3, 1965, 14 claims).

An afterburner device is described which deodorizes the exhaust gas and frees it from harmful or noxious compounds before it is discharged to the atmosphere. The afterburner comprises a

combustion chamber with inlet and outlet passages having a common wall for heat exchange and with igniting means surrounded by catalyst. The heat created by the catalytic combustion is used to heat the exhaust gas entering the afterburner to reaction temperature.

APTIC NUMBER 13650

3657

Berghelm, Carl Arne and Goeran Stahre
METHOD OF RECOVERING VALUES FROM THE PYROLYSIS OF SPENT SODIUM SULFITE LIQUOR. (Billeruds Aktiebolag and Svenska Cellulosa Aktiebolaget) U. S. Pat. 3,250,591. 5p., May 10, 1966. 4 refs. (Appl. July 1, 1963, 4 claims.)

A method for recovering soda and sulfur dioxide from a spent sodium sulfite cooking liquor is presented. The liquor is pyrolyzed to produce hot gases containing hydrogen sulfide and fine soda particles. The gas is cooled to below 300 C and subjected to a dry cyclone separation process to extract a major portion of the soda particles. The gas is then scrubbed with an aqueous solution containing at least 100 g sodium bicarbonate/l at a temperature at which there is no substantial condensation. The cold gas is then combusted, transforming its hydrogen sulfide content to sulfur dioxide.

APTIC NUMBER 13694

3658

Bergmann, L.
COST OF INSTALLING AND REMOVING FILTER BAGS IN DUST COLLECTION PLANTS. (Kosten fur den Ein- und Ausbau von Filterschlauchen in Entstaubungsanlagen). Text in German. Zement-Kalk-Gips, 57(12):500-502, Dec. 1968. 7 refs.

For determination of costs and time required for maintenance of filter bags an inquiry was started to which 26 firms in the chemical, cement, steel, and iron industries responded. The average number of hours for removal and re-installation of filter bags for cleaning was 34.2. Average costs for each cleaning of 100 filter bags amounted to 280 and 300 DM. This calculation was based on an average length of medium quality filter bags of 2800 mm and a diameter of 190 to 200 mm. Thus, one cleaning of the filter bags amounts to 11% of the total livestment cost. It increases to 25% when less expensive cotton is used. With more expensive material, maintenance costs are reduced to 3 or 4% of the investment costs. Maintenance costs can also be reduced by using trained personnel. The location of the filters is another factor which may help to save costs if wisely selected. Good maintenance service prolongs the life of the bags. Frequently bags are hung too loosely and re-strapping becomes necessary. If faultily installed, the bags may soon break. If felt is used as a filter material, particular care and expert personnel are required. It is suggested that a bonus for maintenance personnel may prevent negligence on their part.

APTIC NUMBER 13079

3659

Bethune, W. J. and Lance J. Foord
FUME ABATERS CLEAN EXHAUST FROM WIRE ENAMEL CURING OVENS. Wire Wire Prod., 44(7):50,94, July 1969.

Catalytic oxidation systems, installed on two wire enamel curing ovens at the Canadian General Electric Co., clean phenols and other residual solvent contaminants from oven exhaust air. This system uses no water. The gaseous pollutants are burned while the exhaust remains in a vaporous state in the air exhaust stream. The combustion occurs as the preheated stream passes through a catalyst-coated honeycomb bed housed in a steel chamber erected above the oven. Formerly, the ovens had to be shut down every six weeks while the water scrubbers were cleaned. The maintenance of the catalytic beds has been minimal and operation can now be continuous. Another advantage of the catalytic system is the air turbulence created by the process fan which draws the exhaust fumes from the oven and the combustion fans which mix the preheated air stream with the fumes. This turbulence, along with the controlled heat levels achieved by catalytic reaction, keeps the exhaust fumes in gaseous form, preventing a buildup of oils, resins, and other condensates in the oven exhaust vents and stacks.

APTIC NUMBER 13809

3660

Bienstock, Daniel, J. H. Field, and J. G. Myers
PROCESS DEVELOPMENT IN REMOVING SULFUR DIOXIDE FROM HOT FLUE GASES. 3. PILOT PLANT STUDY OF THE ALKALIZED ALUMINA SYSTEM FOR SO2 REMOVAL. Bureau of Mines, Washington, D. C. RI 7021, 52p., July 1967.

The use of alkalized alumina in removing SO2 from a coal-combustion flue gas at 625 F was investigated on a pilot plant scale. The absorber was 26 feet long and 1.6 inches ID. Counter-current gas-solids flow at gas velocities of 8 to 15 ft/sec in the presence and absence of baffles, as well as solids entrainment at gas velocities of 20 to 23 ft/sec with solids recycle, were employed. The spent absorbent was regenerated as a fixed bed with the reducing gases, reformed natural gas, and hydrogen. Twenty cycles of absorption-regeneration were successfully completed using the alkalized alumina rolled into spherical granules 10 to 16 mesh. There was no loss in activity of absorbent toward SO2 with a modest attrition equivalent to 0.1% of the solids feed. Supporting studies were conducted on the effect of the sodium content in the absorbent, the composition of the reducing gas, thermal treatment to increase absorbent hardness, and removal of absorbed chlorine from the absorbent. A mathematical model was formulated to describe the removal of SO2 by alkalized alumina from fixed and falling beds. (Author abstract modified)

APTIC NUMBER 13338

3661

Bienstock, Daniel and Joseph H. Field
PROCESS FOR REMOVING SULFUR DIOXIDE FROM GASES. (United States

of America) U. S. Pat. 3,150,923. 6p., Sept. 29, 1964. 11 refs. (Appl. Jan. 18, 1962, 8 claims).

The removal of SO2 from hot waste gases by contacting the gases with solid manganese oxide is described. The reaction of the SO2 with the manganese oxide results in the formation of manganese sulfate, which is treated with a sodium hydroxide solution in order to regenerate the manganese oxide absorbent and to form a solution of sodium sulfate. Electrolyzing the sodium sulfate solution produces sodium hydroxide, and sulfuric acid is recovered as a by-product. A flowsheet illustrating the process is included.

3662 APTIC NUMBER 13360

Bondarenko, V. V. and T. G. Toshev
AFTERBURNING OF CONVERTER GASES IN GAS-COOLING BOILERS OF THE TYPE OKG-100-2R. Steel (USSR) (English Transl.), no. 3:50-53, March 1969. 2 refs.

Trials on the afterburning of carbon monoxide in converter gases were conducted at iron and steel combines in Poland and Bulgaria to establish optimal gas-air ratios for the operation of type OKG-100-2R waste-heat boilers (converter gas coolers). The effect of the air blast fed to the boiler on the degree of afterburning was also investigated. Results show that the afterburning process proceeds with a variable coefficient of excess of air along the length of the boiler sections, the value of the coefficient of excess of air depending primarily on the rate of decarburization in the boiler. Among the factors influencing decarburization is the rate of oxygen supply. At a mean rate of 210 to 215 cu m/min, the boilers ensure almost complete afterburning of the carbon monoxide. Provided the minimum value of the coefficient of excess of air does not fall below 1.7 in front of the downcomer section of the boiler, the supply of air blast to the boiler has little effect on afterburning. Even without a supply of blast, high flow velocities of the gas-air mixture promote good mixing and complete afterburning of the carbon monoxide. The influence of the blast supply becomes more marked at lower flow velocities and at reduced coefficients of excess air values. Optimum gas-air conditions for the boilers comprise a minimum value of the coefficient of excess air of about 1.25 and a blast supply at the rate of 12,000 cu m/hr.

3663 APTIC NUMBER 13569

Boving, Jens Orten
IMPROVEMENTS IN OR RELATING TO THE TREATMENT OF WASTE INDUSTRIAL GASES. (Lodge-Cottrell Ltd., Birmingham, Great Britain) Brit. Pat. 435,560. 6p., Sept. 23, 1935. (Appl. March 23, 1934, 9 claims).

A process of removing sulfur oxides from the effluent gases of boiler and other power plants is described. The hot gases, without previous moistening, are contacted with a dry solid oxide, hydroxide, or carbonate of calcium at 400 to 625 C. The reaction between the sulfur oxides and the absorbing agent may be facilitated by mixing the calcium compound with a catalyst such as iron oxide. An electrical gas cleaner or cyclone separator may be placed in the path of the gases to remove any dust that may be present.

3664 APTIC NUMBER 13856

Brennan, Peter J.
COAL RESEARCHERS ARE GRAPPLING WITH SULFUR. Chem. Eng., 74(21): 114-116, 118, Oct. 9, 1967.

Various processes for controlling sulfur emission into the atmosphere, caused by the combustion of coal, are discussed. Researchers at the U. S. Bureau of Mines Coal Research Center are studying an approach based on magnetism for removing pyrites from coal before combustion. They have found that coal is transparent to certain kinds of microwave emissions that are absorbed by pyrites: they reason that such absorption could heat the pyrites to the pyrrhotite-transition temperature without adversely affecting the coal itself, thus allowing magnetic separation. The pyrites must be heated to this temperature (about 750 F) because they are only slightly magnetic, whereas pyrrhotite is strongly magnetic. The Center has also developed a two-stage air classification system that takes advantage of the density differential between coal and pyrites to clean the coal as it is fed to the burners. Another method utilizes the difference in hardness between coal and pyrites by using a tramp-iron chute in the pulverizers to reject larger pieces of pyrites before grinding. Methods of removing sulfur from stack gases, such as using dolomite to neutralize SO2 in combustion gases and adsorption processes, are described, and some unconventional, relatively inexpensive methods are also discussed.

3665 APTIC NUMBER 13206

Bulicka, Milan, Jaroslav Podmolik, and Josef Hajek
ECONOMY OF ABSORPTION UNIT INSERTED FOR LOWERING OF EXHALATIONS FROM SULPHURIC ACID PRODUCTION PLANT. (Ekonomie vyroby kyseliny sirove s vlozenou absorpci). Text in Czech. Chem. Prumysl (Prague), 19(3):140-142, 1969. 5 refs.

When the daily production of sulfuric acid ranged to 100 t/day, with 95 to 97% conversion and with an average absorption of 99%, even with relatively low chimney heights, the immediate vicinity of factory was free from emissions. When production exceeded 300 t/day, higher chimneys did not sufficiently reduce the local concentrations. In most plants using the heterogeneous oxidation manufacturing method, SO2 emissions are 0.2 to 0.4%, SO3 emissions are 0.02 to 0.1%, and H2SO4 emissions are 0.075%. For the work in Prerov, which produces 100,000 t/year, a two-stage exothermic process of catalytic oxidation of SO2 was adopted. Output is higher than 103,000 t/year, and 10 kg of sulfur are recovered for 1 t of the manufactured sulfuric acid. The process uses a closed circuit of cooling water which requires 20% more water than with traditional methods, and 3.5 kWh/t more sulfuric acid, and which produces 10 kg less of steam per ton of sulfuric acid. The cost of the absorption equipment is offset by the value of the sulfur recovered. The greatest advantage of the unit is its reduction of harmful emissions.

3666 APTIC NUMBER 13125

Bulina, Vladimir
GAS VOLUME AND PRESSURE CONDITIONS IN TANDEM FURNACES. (Mnozstvi plynu a tlakove pomery u dvounistejovych ocelarskych peci). Text in Czech. Hutnicke Listy (Prague), no. 3:167-171, 1969.

The pressure conditions in tandem furnaces and the method for calculating the volume of gases escaping from the furnace are discussed. By affecting the pressure field so that the furnace pressure is equal in both hearths to the pressure of the ambient air in the tilting axis of the furnace, carbon monoxide and dusts can be eliminated from the combustion gases. The problem of independent pressure regulation in the hearths by the propulsive jets and methods for increasing their efficiency are discussed. (Author summary modified)

3667 APTIC NUMBER 13049

Bush, R.I., Charles T. Holland, K.K. Humphreys, J.W. Leonard, Charles H. Sawyers, and E.H. Wilson
COAL UTILIZATION. Mining Engineering, 21(2):114-117, Feb. 1969.

Research efforts on sulfur removal from coal are primarily directed at reducing pyrite content. Generally, the coal is crushed to 48 to 200 mesh to liberate the pyrite grains which are removed electrostatically or magnetically. Research in the area of coal gasification and liquefaction is being carried out by the Office of Coal Research. A pilot plant is currently in operation to produce synthetic crude refinery feedstock and a high-ash char for power generation. The process consists of partially dissolving coal in a coal-derived solvent and separating the liquid extract from the residual fuels. The liquids are hydrogenated to produce the synthetic crude for gasoline production. The possibility of commercially attractive fluidized bed combustion techniques continues to improve through research. The fluidized bed principle consists of combustion of fuel particles in a highly-mobile, fluid-state inert bed through which fluidizing gases pass. The turbulent motion of the fluidized bed causes release and transfer of heat. This method of combustion reduces combustion emissions. The effect of air pollution legislation on the coal industry is reviewed.

3668 APTIC NUMBER 13707

Bylov, V. D., Yu. D. Znamenskiy, L. P. Kapitonova, and M. S. Shchedrov
ON THE SULFURIC ACID METHOD OF COLLECTING NITROGEN OXIDES FROM INCOMPLETELY OXIDIZED GASES. (K voprosy o sernokislotnom metode ulavlivaniya okislov azota iz nedookislennykh gazov). Text in Russian. Zh. Prikl. Khim., vol. 35:1503-1505, 1962. 3 refs.

Incompletely oxidized gases were oxidized with a solution of HNO3 in 93% sulfuric acid in a one-tray bubbling column to study aspects of sulfuric acid collection of nitrogen oxides. Maximum removal (79%) was achieved with a 5% HNO3 concentration and an input NO plus NO2 concentration of 0.573 volume percent. It is concluded that effective sulfuric acid removal of nitrogen oxides with 93% sulfuric acid can be accomplished after preliminary oxidation with a 3-4% solution of HNO3 in 93% H2SO4 when the oxidation and absorption cycles are carried out separately in the liquid phase.

3669 APTIC NUMBER 13091

Cameron, T. L.
ELECTRONIC AIR CLEANER INCREASES FILTER LIFE. Contamination Control, vol. 7: 16-17, March 1969.

A high expiration rate for HEPA filters in the laminar flow benches located in factory areas was encountered. The high degree of dust particle concentration in these areas caused filters to load up and reduced the air flow on benches below the 90 = or - 20 FPM velocity specified by Federal Standard No. 209. Life expectancy of HEPA filters was as low as two months in some instances. After an investigation was made of available pre-filter materials, a residual-type electronic air cleaner was suggested as a possible solution to the problem. It was found that by attaching a residual electronic air cleaner as a pre-filter, 90% of the dust particles were removed before they reached the HEPA filter, thereby increasing HEPA filter life ten-fold.

3670 APTIC NUMBER 12664

H. J. Campbell, Jr., A. L. Friedland
INCINERATORS AND THE PUBLIC. Mech. Eng., 90(12):38-43, Dec. 1968.

Master planning for community incinerator design involves consideration of the site from the point of view of convenience when erected, likely shifts in population density, availability of nearby areas requiring landfill, and projected other social uses of the site 20 to 30 years later. Multiple incinerator units seem to offer an insured actual continuous burning capacity, even in the event of operational failure of one unit, so that refuse accumulation can be avoided. Economic, aesthetic, and community considerations are all discussed.##

3671 APTIC NUMBER 13018

Carsey, E.A.
CENTRIFUGAL COLLECTORS DESIGN CHARACTERISTICS, APPLICATIONS. Plant Eng., 23(6):56-58, March 1969.

The most widely used dust collector and separator is the centrifugal collector, a cylindrical gravitational device. A basic collector has no moving parts, consists of a cylindrical body, a bottom cone equipped with particulate outlet, and a top air outlet. Centrifugal separators can operate with a fan which draws air through them, or a blower which pushes air into them. Centripetal forces within a collector act upon solid particulate

matter in the gas stream, causing downward flow to the bottom cone or discharge outlet. Simultaneously, an upward spiralling vorter counterflow is established. This flow, which is central to the collector axis, has a tendency to weave. Weaving can be eliminated by collector design. Generally, small diameter collector units are more efficient than large units. Collectors are efficient handling devices for a wide range of particulates. Centrifugal separators handle particles ranging from less than 5 microns to above 2000 microns, and inlet loadings less than 1 grain/cfm to amounts in excess of 100 grains/cfm.

3672 APTIC NUMBER 13796

COKE CLEANS FLUE GAS IN GERMAN PROCESS. Chem. Eng., 74(22): 94-98, Oct. 23, 1967.

A new adsorption technique was developed by Reinluft GmbH for removal of sulfur oxides. The new system is said to be able to handle flue gases containing dust up to 0.8 to 0.9 grains/cu ft, S compounds, nitrogen oxides, Cl2, H2 halides, and tarry hydrocarbon substances. Flue gases containing SO2 are passed over activated carbon at about 120 to 320 F in the presence of O2 and H2O vapor. The dioxide is oxidized to the trioxide. This immediately hydrates to H2SO4, of a concentration depending on the amount of H2O vapor present in the gas. Although the higher adsorption temperatures hinder the initial adsorption of the sulfur dioxide and O2, this is partially offset by higher gas reaction rates. The design calls for carbon regeneration at about 750 F. The H2SO4 evaporates and splits into SO3 and H2O. The trioxide is reduced to the dioxide. Relatively inexpensive semi-coke is used, after a simple treatment, instead of activated carbon. Although the raw semi-coke coming from a carbonizing plant is not activated, a single or repeated impregnation with H2SO4 and subsequent evaporation at above 750 F turns it into an effective adsorbent material. Cleaning efficiencies of up to 99.9% have been experienced with the process. Operating costs for a 6.3 million cu ft/hr plant are $25 to $30/hr, depending on the S content of the gas and taking no credit for by-products. This is about half a mil per kw-hr.

3673 APTIC NUMBER 13672

KENNECOTT STARTS UP HUGE H2SO4 PLANT. Chem. Eng. News., 45(13):59-61, 1967.

Kennecott Copper's sulfuric acid plant near Salt Lake City is autothermal and designed to run on smelter gas containing 2-6% SO2. Gas from copper converters first goes through a glass cleaning section comprising a Cottrell precipitator, a large Peabody scrubber, and Cottrell mist eliminators. The cleaned gas passes through a drying tower, two 2000 hp blowers, and into a series of five gas-to-gas heat exchangers before entering a three-pass converter where SO2 is converted to SO3. From the converter, the gas goes to the absorbing tower where the SO3 is absorbed by 98% sulfuric acid. The efficiency of the absorption towers is considered to be doubled by the use of 3 in. interlocked saddles, which allow a higher throughput of gas, and by an increased number of distribution ports for the acid that contacts the gas. The mist eliminator installed at the top of the absorption tower is a two-stage device with a Teflon mesh.

3674 APTIC NUMBER 12659

SCIENCE LENDS A HAND TO PRESERVE ART TREASURES. Chem. Eng. 75(26):72, Dec. 2, 1968.

Formulas for coating that will protect some artifacts, sculptures, and buildings from the eroding effects of air pollution and weather have been developed at the Conservation Center of New York University's Institute of Fine Arts. One formula, a colorless mixture of water, barium hydroxide, and urea, causes the surface of limestone and other calcium-based stones to become hard without changing their color, texture, or shape. A second formula (composition not revealed) makes silica-based stones, such as sandstone and brownstone, insensitive to water. Other efforts are underway to preserve or restore oil paints, frescoes, and photographs.##

3675 APTIC NUMBER 13806

SULFURIC ACID PROCESS REDUCES POLLUTION. Chem. Eng. News, 42(40):42-43, Dec. 21, 1964.

The Bayer process for H2SO4 production is based on a double pass of SO2-bearing gases through the converter. The first contact is accomplished in three stages of varying depths of vanadium pentoxide. The second contact is accomplished in the fourth stage. The gases increase in temperature from 450 to 600 C in the first stage and must be cooled before entering the second stage. Cooling is accomplished by adding a side stream of cold SO2-containing gas to the reactor just below the first stage. A series of heat exchangers remove the heat of reaction in the remaining three stages. The SO3-rich gas is removed from the converter and the SO3 is absorbed in H2SO4 after the first three stages. The unreacted SO2 is recycled back through heat exchangers to the fourth stage. Up to 99.7% of the original SO2 has been removed after the fourth stage. The gas has an analysis of about 0.7% SO3, 0.03% SO2, 5% O3, and the remainder nitrogen. The SO3 is absorbed in a packed tower. Sulfur dioxide sent to the stack is one-seventh to one-tenth the concentration found in conventional processes.

3676 APTIC NUMBER 13538

Childers, Eugene, Charles W. Ellis, and Donald J. Ryan METHOD OF REMOVING NITROGEN OXIDES FROM GASES. (Du Pont De Nemours (E.I.) and Co., Wilmington, Del.), U. S. Pat. 3,125,408, March 17, 1964. 6 refs. (Appl. Dec. 19, 1955, 1 claim).

A process for the disposal of stack gases containing nitrogen oxide fumes is presented. The waste gas is first mixed with an excess amount of a reducing gas containing 60-90% of an alkane.

The mixture is passed over a platinum catalyst supported on activated alumina at a reaction temperature between 450 and 1000 C, and a space velocity between 25,000 and 150,000 reciprocal hr/cu ft of catalyst. The nitrogen oxide fumes are reacted with the reducing gas to form nitrogen, water, and carbon dioxide which can be discharged to the atmosphere.

3677 APTIC NUMBER 12658

J. L. Clement, J. S. Elliott
KRAFT RECOVERY BOILER DESIGN FOR ODOR CONTROL. Paper Trade J., 152(40):59-60, Sept. 30, 1968.

It is from the direct-contact evaporator, not the recovery furnace, that malodorous gases are emitted. Black liquor recovery furnaces can be operated with complete combustion of malodorous compounds. A recovery boiler design that will eliminate the direct-contact evaporator and is arranged to burn unoxidized black liquor supplied directly from the multiple effect evaporator to the furnace is presented. This design incorporated Scandinavian boiler design experience interpreted in terms of the North American kraft operations.##

3678 APTIC NUMBER 12657

P. Clements
INSULATED FLOATING-FLUE STACKS SPELL ECONOMY AND LONG LIFE. . .AND FIND INCREASING APPLICATION IN EUROPEAN INDUSTRIAL AND HEATING PLANTS. Power, 112(11):88-89, Nov. 1968.

Insulated, prefabricated industrial stacks are efficient, economical, and aesthetically attractive. The stack described is a multiflue form. The void between the flues and the outer casing is filled with loosely-packed insulating material, blown in through a small-diameter tube which extends to the top of the stack. Due to this insulation, and to insulated flue seatings and locating rollers, the outer structure remains at close to ambient temperatures, eliminating the danger of dew-point corrosion. Variations in construction may depend on size, availability of material, and aesthetics: Some have concrete shells, some steel. Replacement of one flue without shutting down boilers exhausting into the others has proven to be feasible.##

3679 APTIC NUMBER 13501

AIR-POLLUTION CONTROL: THE SULFUR PROBLEM. Coal Age, 70(8):58-62, Aug. 1965.

Current research on sulfur dioxide elimination from coal and flue gases is reviewed. Only a fraction of the coal reserves meets the standards set by the Public Health Service for new federal installations (0.7% sulfur for coal and 1.0% for fuel oil), and there is no practical means now available for removing enough sulfur from coal to make it conform to this standard. The alternate approach to control of sulfur dioxide emission is through the application of a process for recovering sulfur dioxide from the flue gases after burning but prior to emission from the stack. A gas-processing device could enable the reduction of SO2 emission to 300 ppm with a 3.4% sulfur coal, about 10% of the normal amount for such a coal. Three processes which appear promising are the Reinluft process, the alkalized-alumina process, and the catalytic gas-phase process. Costs for 1965 are given.

3680 APTIC NUMBER 13813

Cochran, Neal P.
COAL RESEARCH. Mining Congr. J., 51:83-88, Feb. 1965.

The Office of Coal Research is conducting several programs on coal conversion and combustion. Research on converting coal to liquids includes a study on the production of gasoline from coal, a study on the direct hydrogen-carbon reaction to produce high Btu gas and liquid fuels, a study on carbonization, including the construction of a pilot plant at the Princeton Laboratory, and a study for reacting coal and crude oil residuum in a fluid coker to skim off both the coal and residue for production of more valuable fuels. A recently completed program on corona processing revealed that this procedure is economically unfeasible. Work is continuing in converting coal to pipeline gas. A slagging, pressure, steam oxygen, fixed bed gasifier has demonstrated that lignites containing as much as 35% moisture at ash fusion temperatures around 2600 F could be gasified with high throughput rates and low oxygen consumption. Hydrogasification tests of char at 3000 lbs have indicated the feasibility of a two-step process of converting coal to pipeline gas. Coal combustion research programs have shown that nitrous oxide in stack gases can be reduced 62% by burning in 5% excess air. Current programs are investigating reduction of stack gas SO2 pollution through by-product recovery and production of sulfuric acid.

3681 APTIC NUMBER 13554

Cohn, Johann G. E.
METHOD OF REMOVING NITROGEN OXIDES FROM GASES. (Engelhard Industries, Inc., Newark, N. J.) U. S. Pat. 3,118,727. 4p., Jan. 21, 1964. 9 refs. (Appl. Oct. 12, 1956, 11 claims).

A process is described for recovering heating values and purifying waste gases produced by the oxidation of ammonia in the production of nitric acid. Waste gases are mixed with a hydrocarbon fuel and the mixture is passed over a 0.1 to 5.0% by weight rhodium and/or palladium supported catalyst at the reaction temperature of 700-725 F. The heat generated in passing the mixture over the catalyst may be used to raise the gas temperature or to generate steam isothermally. Space velocity for the reaction may be in the range of 60,000-110,000 standard vols of gas/vol of catalyst/hr. The more hydrocarbon fuel used, the more complete is the removal of nitrogen oxides.

3682 APTIC NUMBER 13514

Cooper, P. W., H. Kano, C. J. Marek, and C. W. Solbrig
RECIRCULATION AND FUEL-AIR MIXING AS RELATED TO OIL-BURNER DESIGN.

American Petroleum Institute, New York, N. Y., Div. of Marketing, 1968, 75p. 13 refs.

The effects of excess air, turbulence, and combustion product recirculation on smoke formation in a pressure-atomizing burner system were evaluated. Under conditions of turbulence and excess air which normally yield excessive smoke, the recirculation of sufficient combustion products back to the burner inlet produced a transition to smoke-free combustion. Lesser amounts of recirculation have little effect. The contribution of individual flue gas components in the recirculation stream was studied by adding nitrogen, carbon dioxide, oxygen, and steam to the inlet air. The critical dilution necessary for smoke-free combustion was determined for each. Experiments also included the mapping of a second transition between luminous combustion and nonluminous combustion; this transition is reached at higher levels of recirculation than for the first transition to smoke-free combustion. The recirculation was found to increase with excess air but appears to be independent of turbulence level.

3683 APTIC NUMBER 12672

W. H. Crane, T. J. H. Bolre
STEAM INJECTION AS A MEANS OF PREVENTING DEPOSIT FORMATION IN ECONOMIC BOILERS. J. Inst. Fuel, 41(334):426-432, Nov. 1968.

Some coals promote heavy formation of bonded deposits in shell boilers and this can lead to stoppage of the plant for cleaning. The work described here was aimed at reducing this deposit formation. The effect of a steam jet in the furnace tube on the formation of bonded deposits was assessed using an Economic boiler while this boiler was being used to supply the central heating load. A coke with a high chlorine content was burnt. In one test, used as a control, the boiler was operated in the normal way to provide the daily demand without cleaning the tube bank until the combustion chamber had become severely obstructed by bonded deposits. The boiler was then cleaned and the run was started again, but this time steam was supplied to a jet behind the bridge wall. This run was still in progress at the end of the heating season when, although slightly more coal than in the control run had been burnt, the tube bank was comparatively free of deposits. (Author's Abstract)##

3684 APTIC NUMBER 13044

Baigh, Harold D.
VEHICLE VAPOR RECOVERY SYSTEM. (Atlantic Richfield Co., Phila., Pa.) U.S. Pat. 3,448,731. 13p., June 10, 1969. 13 refs.

A fuel vapor recovery system for use with internal combustion engines in automotive vehicles is described. The fuel tank is connected to the carburetor through a suitable conduit. A condenser is located in the conduit in a cool area of the vehicle to facilitate condensation of vapors removed from the fuel tank and/or the carburetor. The condenser is vented into the crankcase and positioned below the carburetor but above the fuel tank to permit gravity flow of fuel between the carburetor and condenser and between the condenser and the fuel tank. An adsorptive filter in the condenser vent line removes uncondensible hydrocarbons. The filter can be desorbed periodically with air drawn through a one-way vent valve. Means are provided for partially draining the carburetor float bowl during the hot soak period to minimize evaporative fuel losses. Heating of the remaining fuel in the float bowl is minimized by a carburetor design modification that reduces conductive heating by the engine block. (Author abstract modified)

3685 APTIC NUMBER 13051

Dedlow, Robert P.
MAINTENANCE AND SAFETY OF ELECTROSTATIC PRECIPITATORS. Minerals Process., 10(8):8-12, 22, Aug. 1969.

Reliable expense data on precipitators is sharply out of proportion to the growth of the cement industry. Unfortunately, few plant operators collected man hour data and converted it into unit dollar costs for precipitator maintenance, with the result that reliable cost data is lacking. It is assumed that increased pressure for air pollution control, increased dust collection equipment size, and increased labor costs are quadrupling maintenance costs. The size and efficiency of a precipitator for any given condition are shown to vary as a function of the collecting surface area. Equipment costs relate closely to collection surface area because, within narrow limits, all other components are dictated by surface area. Maintenance costs are proportional to the quantity of equipment maintained. However, even an adequately maintained precipitator can perform below its rated efficiency, resulting in a loss of thousands of dollars. This loss of efficiency is easy to calculate and can be related to equivalent original cost. Preventive maintenance of precipitator components is stressed and new safety devices are reviewed. These include automatic controls and solid state rectifiers.

3686 APTIC NUMBER 13045

Deeley, J. E. and A. H. Kirkby
THE DEVELOPMENT OF THE CHEMICAL RECOVERY BOILER. J. Inst. Fuel, p. 3-10, Sept. 1967. (Presented to the Scottish Section of The Institute of Fuel, March 22, 1966.)

The main constituent of the digesting liquor in the acid or sulfite process of pulp production is either calcium bisulfite or magnesium bisulfite; both produce a residual liquor which makes recovery difficult. The residual liquors from the alkali or sulfate process of pulp production can be treated simply, which solves the disposal problem and achieves chemical recovery. To recover the black liquor, it is sprayed across a furnace to the side and rear walls through a nozzle. The deposit is in the form of char which accumulates to an appreciable thickness while it is being concentrated by heat from the combustion gases. When dehydration is complete, the dry char falls to the furnace hearth. The smelt

formed flows through a tapping hole, where it is discharged into a dissolving tank. To combat low-temperature corrosion, the high-temperature electric precipitator and a circulating economizer with indirect air heating have been especially developed for the recovery unit. The difficulties and operating hazards of a recovery furnace are related to combustion, smelt removal, furnace explosions, and smelt leakage.

3687 APTIC NUMBER 13632

Durrant, T.
THE CONTROL OF ATMOSPHERIC POLLUTION FROM GAS TURBINE ENGINES. Preprint, Society of Automotive Engineers, Inc., New York, 8p., 1968. 6 refs. (Presented at the Air Transportation Meeting, New York, April 29-May 2, 1968. Paper 680347.)

The main forms of atmospheric pollution by gas turbine exhaust are smoke and nitrogen oxides at top speed and unburned fuel and carbon monoxide at idle engine conditions. Smoke trails constitute a visual nuisance and the other contaminants are either toxic or irritating or both. Smoke emissions are being controlled by incorporating known methods of combustion chamber design, including airspray fuel injectors. Annular chambers now being introduced have a smaller flame tube wall surface area and hence use less cooling air than the tuboannular system. Unburned fuel and carbon monoxide concentrations will therefore be lower than in engines currently in service. Nitrogen oxides are the most difficult contaminants to control. Intensive investigations are being conducted, although current concentrations are less than measured on the automobile. It is tentatively suggested that nitrogen oxide concentrations may be lowered by operating with a richer primary combustion zone.

3688 APTIC NUMBER 13133

Dvirka, Miro
INCINERATOR AND FLY ASH SEPARATOR STRUCTURE THEREFOR. (Hagan Industries, Inc., Corona, N. Y.) U. S. Pat. 3,448,704. 5p., June 10, 1969. 6 refs. (Appl. July 8, 1966, 13 claims).

An incinerator having a combustion chamber, a flue, and a structure for separating fly ash or solid particles from combustion gases emanating from the combustion chamber is described. The dust collection system is made up of a settling chamber, an inlet passage connected to the combustion chamber, and an outlet passage connected to the flue. The inlet and outlet passages are situated in such a way that the combustion gases passing through the settling chamber describe a curved path about a center of curvature located between the passages. The intake of the outlet passage is located close enough to the center of curvature that the fly ash migrates along involute paths under the influence of centrifugal forces resulting from the motion of the combustion gases. The ash impinges on a wall of the settling chamber and is trapped. The cleaned air then passes out through the flue. A relief passage connecting the settling chamber to the flue should have a cross-sectional area of not more than 5% of the flue area. The cross-sectional areas of the inlet and outlet passages should be equal.

3689 APTIC NUMBER 13041

Dymond, J.L.
AIR POLLUTION CONTROL EQUIPMENT. The SAE-Australasia, 29(2):56-62, March-April 1969.

Legislation limiting automotive emissions is causing automotive manufacturers to design equipment capable of reducing pollutant emission. The second largest source of hydrocarbon emission is the crankcase. This emission is being controlled by eliminating the road draft tube and rerouting the blowby gases back into the intake manifold or inlet of the carburetor. The blowby gases are then reintroduced into the combustion chamber where they are burned along with fresh incoming air and fuel. Systems using these methods are known as positive crankcase ventilation systems (PCV). The many designs of PCV systems can be categorized into three basic types: air cleaner return system, intake manifold return PCV system, and combination air cleaner and intake manifold return PCV system. Recirculation of blowby gases within the engine necessitates the addition of an alkaline additive to the lubricant oil to neutralize acidic vapors and fuel additives are also needed to prevent valve plugging.

3690 APTIC NUMBER 13638

Ehrenberg, Wolfgang
ABSORBENT FOR THE REMOVAL OF SO2 FROM WASTE GASES. (Filtermasse zur SO2-Entfernung aus Abgasen.) Text in German. Chem. Ing. Tech., 38(7):789, 1966.

In the search for a suitable absorbent, grained NaHCO3 has been selected for removing SO2 from CO2-laden gases because it is inexpensive, does not react with CO2, and is non-volatile. The main difficulty, however, is to maintain its grain structure. Therefore, ordinary NaHCO3 powder (grain size 0.01 to 0.1 mm) was mixed with water and evaporated at 120 C. In this manner, the crust gains sufficient strength and porosity and is then crumbled to grains of 1 to 8 mm diameter. This mass becomes reactive only when wetted. It was tested first at low flow velocities (0.5 cm/sec) and high SO2 concentrations (15% by volume). With an absorbent layer of 4 cm, almost all the SO2 was retained. At 100 times higher flow velocities and lower concentrations, thicker layers must be used (about 10 cm). To prevent drying of the absorbent, moisturizing agents were added. Cooling of the waste gas to the dew point could not be used because of resulting corrosion. By using a half-saturated mixture of KCl and KHCO3 instead of water, operation could take place 20 C above the dew point. The same effect can be expected from other hygroscopic substances, such as NaCl/Na2SO4, which are less expensive. The mixing ratio with the absorbent is 1 to 9. The method has been patented in Germany.

3691 APTIC NUMBER 13337

Emicke, Klaus

A METHOD OF REMOVING SULPHUR DIOXIDE FROM GAS CONTAINING SULPHUR DIOXIDE. (Nor Deutsche Affinerie, Hamburg, Germany), British

Pat. 1,107,626. Sp., March 27, 1968. (Appl. June 11, 1965, 12 claims).

A method of removing SO2 from exhaust gases is described. The gas is brought into contact with an aqueous solution of selenious acid in reaction vessels through which the solution is passed in countercurrent to the gas which contains SO2. The removal of the SO2 is performed in two stages. The selenium which is formed in the first stage is removed from the circulating liquor, and the SO2 is completely removed from the gas in the second stage. It is possible to perform this method economically and to remove the SO2 completely because the selenium formed is precipitated in solid form and does not dissolve in the H2SO4 which is formed simultaneously.

3692 APTIC NUMBER 12645

SO2 CONTROL PROCESSES FOR STACK GASES REACH COMMERCIAL STATUS. Environ. Sci. Technol., 2(11):994-997, Nov. 1968.

The combustion of fuel for power generation accounts for 46% of the SO2 emitted to the atmosphere, and 58% of that total results from the combustion of coal. Air quality criteria for SO2, the prelude to federal control standards, are due from the Department of Health, Education, and Welfare by the end of the year. Several processes for control of SO2 in stack gases which have reached commercial status are discussed. These include: The Monsanto catalytic oxidation process; the Combustion Engineering, Inc. alkaline earth injection system; the Tennessee Valley Authority dry limestone injection process; the Wellman-Lord, Inc. Clean Air Demonstration Plant; and the Stone & Webster Engineering Corp.-Ionics, Inc. caustic scrubbing process. Several other processes that have not gotten beyond the pilot plant stage are also discussed.##

3693 APTIC NUMBER 13676

Erga, Olav, Kare Ryan, and Adolf Syrdal
RECOVERY AND UTILIZATION OF FLUORINE PRODUCTS FROM ALUMINUM ELECTROLYSIS WASTE GASES. In: Abgasser, Abgas Schwebstofftechnik, Dechema-Monograph., 59(1045-1069), Frankfurt am Main, Deutsche Gesellschaft fur chemisches Apparatewesen E.V., 1968, p. 191-198. 4 refs.

Gases released during aluminum electrolysis contain HF, SO2, and CO2 which are all absorbed with the alkaline solution used in present recovery procedures. A method and apparatus are presented for the selective recovery of HF for hydrofluoric acid production. A sieve plate scrubber utilizing water as the absorption agent was developed by Elektrokemisk. The device features a tower consisting of sieve plates and funnels and a circulation pump for gas distribution. One unit is sufficient for HF recovery. Pilot plant tests showed more than 99% of the HF was absorbed, producing an acid of 3% HF by weight. The co-absorption of SO2 was negligible. Use of the tower for cryolite production also results in an economically feasible by-product.

3694 APTIC NUMBER 13537

Ernenc, E. D.
WISCONSIN PROCESS SYSTEM FOR RECOVERY OF DILUTE OXIDES OF NITROGEN. Chem. Eng. Progr., 52(11):488-492, November 1956. 10 refs.

The Wisconsin Process was proven technically feasible as a means of producing HNO3. The recovery system operated in accordance with design, except for minor modifications made in the field. Total cost of the nominal 40 tpd equivalent 100% HNO3 plant, including engineering and overhead, was slightly over $2,000,000, with about 60% of the cost in the recovery system. The bulk of the operating costs also occurred in the recovery system. Since the system is not quite economical enough for the production of a cheap chemical like HNO3 in the U. S., it may have eventual use in the production of N2O4 or recovery of dilute nitrogen oxides for pollution prevention. There may still be areas in the world where the Wisconsin Process may be economic, particularly where ammonia is expensive or not available.

3695 APTIC NUMBER 13166

Ferrari, G. and A. Radaelli
STUDY ON THE COMBUSTION OF A 'STRATIFIED CHARGE' IN A REACTION TUBE. (Studio della combustione di una carica stratificata mediante tubo di reazione). Text in Italian. Riv. Combust., 23(3):113-120, March 1969. 8 refs.

A prototype motor with controlled ignition was developed to study the possibilities of reducing automobile exhausts. The motor uses a lean mixture to avoid atmospheric contamination and to improve operating efficiency. The difficulty in heating the mixture is overcome by enriching it near the spark plug. As a result, the heterogeneous distribution of the mixture is accomplished in the reaction tube, and the mixture is called a 'stratified charge'. The fuel system is specially designed to supply the tube with a constant fuel/air ratio. The speed of the flame front propagation was measured. The composition of burned gases was also tested in relation to the total fuel/air ratio of the mixture. The CO percentage and the quantity of unburned substances were examined by means of gas chromatography. The results of the study on rich or slightly lean mixtures are similar to those already obtained by several authors, for example, Wachal Eberhorst, and Baudry. Concerning the trials on lean mixtures, the levels of CO percentages are quite low, i.e., approximately 0.2%, while the percentage of unburned hydrocarbons is higher due to the lower speed of flame front propagation.

3696 APTIC NUMBER 13405

Feustel, Klaus, Friedrich Johswich, and Heinz Stratmann
PROCESS FOR REMOVING SULFUR OXIDES FROM GASES. (Reinluft G.m.b.H.,

Essen-Ruhr, Germany) U. S. Pat. 2,992,065. 4p., July 11, 1961. 3 refs. (Appl. June 24, 1959, 6 claims.)

A method is described for removing sulfur dioxide and sulfur trioxide from furnace exhaust gases which are to be used in the regenerative heating of furnace draft gas. The hot gas stream is contacted with a carbonaceous adsorbent at a temperature between 150 and 250 C to adsorb the sulfur trioxide. The gas is then cooled to a temperature between 100 and 150 C and contacted with the adsorbent to remove sulfur dioxide. The adsorbent is heated to between 300 and 600 C to reduce the adsorbed SO3 to SO2, the SO2 is removed, and the adsorbent may be reused.

3697 APTIC NUMBER 13157

METAL FIBRE FILTER MEDIA FOR MICRON RANGE DUTIES. Filtration Separation (Purley), 6(4):413-414, July/Aug. 1969.

Effective depth filtration, with its advantages of high efficiency and dirt-holding capacity, is now possible through the use of randomly oriented fibrous structures prepared from extremely fine metal fibers. These fibers are produced by the Brunswick Corp. through a new proprietary multidrawing process. A wide variety of metals can be processed, including the 300 series stainless steels, many nickel-based superalloys, tantalum, niobium, titanium, and nickel. Fibers of many of these metals and alloys are available commercially, under the trade name Brunspore, in fiber diameter sizes of 25, 12, 8, and 4 microns. The excellent performance of the Brunspore media is attributed to the use of fine diameter fibers and their fabrication into graded pore-size structures. Graded pore size is achieved by playing together layers of web of different fiber diameters prior to the annealing and compacting operations.

3698 APTIC NUMBER 13142

Flory, Ralph H.
SEPARATOR FOR DISENTRAINMENT OF MATERIAL FROM A GASEOUS FLUID STREAM. (Frick Co., Inc., Waynesboro, Pa.) U. S. Pat 3,447,290. 3p., June 3, 1969. 9 refs. (Appl. Sept. 18, 1967, 6 claims).

The fluid separator comprises an open-ended, cylindrical filter screen coaxially mounted for rotation within a vessel. The vessel is provided with an inlet to receive a gaseous fluid, such as a refrigerant gas, containing material to be separated. The inlet is positioned to discharge the gaseous fluid into an open end of the filter screen. A number of vanes are associated with the filter screen and are positioned so that the gaseous fluid will strike them. This causes the screen to rotate and the gaseous fluid assumes a spiral flow path. The flow path utilizes a centrifugal effect on the dense contaminating material and causes it to strike the screen. The rotation of the screen causes the separated material to be propelled outwardly toward the inner walls of the vessel. An outlet is provided in the vessel to remove the cleaned gaseous fluid stream, while another outlet removes the disentrained contaminants. (Author abstract modified)

3699 APTIC NUMBER 13571

Fontein, F. J.
THE D.S.M. SIEVE BEND) NEW TOOL FOR WET SCREENING ON FINE SIZES, APPLICATION IN COAL WASHERIES. International Coal Preparation Congress, 2nd, Essen, Germany, Sept. 20-25, 1954. 9p., 5 refs.

In coal washeries there is a need for a more economical method of wet screening at 0.5 mm. The sieve bend provides for this need. The layer of liquid and solid particles moving over the bar sieve of the sieve bend becomes thinner because a thin layer of 0.25 mm thickness moves through the slot to the outside. Particles smaller than 0.5 mm can be dragged by this thin layer. Particles coarser than 0.5 mm go over the slot as they are mainly in the flowing liquid. It has been shown that the radius of the sieve bend and the specific gravity of the particles have no influence on the fineness of separation. The capacity of the sieve bend is large because the velocity with which the thin layers spout through the slots is great. This apparatus has application in a variety of industries. For desliming before washers it will be very valuable. It is also possible to apply sieve bends in heavy medium coal washeries.

3700 APTIC NUMBER 13928

Francois, M. C., M. Plantier, M. Bailleul, and G. Guyot
AIR POLLUTION IN THE LACQ COMPLEX. (La pollution atmospherique dans le complexe de Lacq). Text in French. Pollut. Atmos. (Paris), 11(42):71-73, April-June 1969.

A history of the progressive industrialization of the Lacq region is presented. Most of the pollution in this region is caused by the SO2 given off by the Societe Nationale des Petroles d'Aquitaine (S. N. P. A.). It was found that natural gas treatment does not totally eliminate SO2. The S. N. P. A. and the Lurgi-Waerne Company from Frankfurt have developed a new process called 'Sulfreen' which reduces the amount of sulfur compounds emitted into the atmosphere. The first unit will treat 130,000 cu m/hr of gas. The principle of the process is as follows: One of the two reactors is in contact with the gases coming from the two primary converters of the sulfur plant at 125-130 C. Its catalyst becomes increasingly burdened with sulfur while the second reactor is being regenerated by a closed-circuit flow of gas which has been heated in a furnace. The deposited sulfur is vaporized by the hot gas and condensed in the condenser where the gas is cooled. A ventilator completes the circuit.

3701 APTIC NUMBER 13857

Frazier, J. H.
COAL FIRED BOILER STACK EMISSION CONTROL. Nat. Eng., 73(8):8-10, Aug. 1969.

A large corporation, through various divisions, operates a large number of coal-fired boilers. When emissions are marginal, or

excessive, the boiler units are revised or replaced to comply with new regulations regarding stack emissions. Spreader stoker units are equipped with dust collectors varying in type, arrangement, and the amount of cinders returned to the furnace for reburning. Most of these units are also equipped with either economizers or air heaters for heat recovery. Pulverizer units have mechanical dust collectors, except for four plants where electrostatic units have been installed. The varying equipment, locale, coal, and new or foreseeable applicable emission regulations combine to required a study of emissions from each boiler. However, it is stressed that testing should only be done to satisfy the operator or the air pollution control group, since promiscuous stack testing serves no purpose.

3702 APTIC NUMBER 13487

Fukasa, Shin-ichi and Kazumi Kasei
DRY-SYSTEM FLUE GAS DESULPHURIZATION PROCESS (DAP-MN PROCESS) FOR SO2 REMOVAL. Jap. Chem. Quart., 4(3):12-14, July 1968.

The DAP-Mn process for desulfurization of flue gases has the following properties; it removes SO2 efficiently and economically; recovered by products are of marketable quality; the absorbent has long-term operation and can operate reliably with sharp load fluctuations; consumption of absorbent is minimal and SO2 removal is accomplished without a sharp pressure drop; and no major change in the boiler structure is required. After successful laboratory tests in 1963, this desulfurization process which uses manganese oxide and ammonia to make ammonium sulfate from flue gases was tested at a pilot plant in Japan. A semicommerical plant capable of treating gases from a 55 MW power plant has since been constructed and is being test-run in the compound of Chubu's Yokkaichi station. The process occurs three steps: SO2 removal, absorbent regeneration, and by product treatment. Test results indicate a desulfurization rate of 90% at a 1968 cost of $1/ton of fuel oil.

3703 APTIC NUMBER 13662

Ganz, S. N., A. I. Luk'yanitsa and L. A. Bel'china
COMBINED PRODUCTION OF IRON-NITROGEN FERTILIZERS AND PURIFICATION OF GASES FROM NITROGEN OXIDES. (Kombinirovaniye proizvodstva azotnozhelezistykh udobreniy s ochistkoy gaza ot okislov azota). Text in Russian. Zh. Prikl. Khim., 37(1):1609-1611, 1964. 2 refs.

Waste pickling solution from metal-working factories with an approximate content of 25% FeSO4 and 4-5% free H2SO4 can be used for purification of waste gases containing oxides of nitrogen. An unstable complex (Fe(NO)SO4) is formed when the gases are passed through the pickling solution, which on heating breaks down to give FeSO4 and pure NO, which can then be used to form HNO3. Treatment of the ferrous sulfate with ammonia and water gives a mixture of iron hydroxides and ammonium sulfate which can be used as fertilizer. In this paper, rates of absorption of NO and NO plus NO2 by solutions of FeSO4 were studied at various conditions and concentrations of NO and NO plus NO2.

3704 APTIC NUMBER 13560

Gastechnik G.m.b.H., Oberhausen, Germany
IMPROVEMENTS IN OR RELATING TO THE REGENERATION OF GAS PURIFYING MASSES. Brit. Pat. 433,823. 6p., August 21, 1935. (Appl. June 28, 1934, 6 claims).

A process for freeing sulfur compounds such as H2S from gases involves the regeneration of sulfur from gas purifying masses containing ferric hydroxide. Sulfur containing gas is passed through several layers of porous bodies constituting a sulfur absorbing mass. Absorbed gas reacts with ferric hydroxide to form ferric sulfide, which is freed from each layer by oxidation to elemental sulfur and ferric hydroxide. After the absorbing bodies in the lower first container have converted a large quantity of H2S to Fe3S2, the container is plugged and ferric hydroxide is regenerated with air, followed by the resumption of gas admission. Absorbing bodies are rotated until so much elemental sulfur has accumulated that it prevents accession of gas to the ferric hydroxide. At this point, the bodies are removed from the container and sulfur is extracted with a solvent.

3705 APTIC NUMBER 13246

Gavrilov, A. A.
WETTING AGENT 'DB' FOR HYDRAULIC REMOVAL OF DUST. (Smachivatel' 'DB' dlya gidroobesylivaniya). Text in Russian. Metallurg, no. 12:11-12, 1968.

Addition of 0.01-0.1% 'DB' wetting agent (polyoxyethylene ester of ditertiary butylphenol) gives water a surface tension of 28-31 erg/sq cm, and used in hydraulic dust removal from the coke supply for blast furnaces, yields a 70-90% reduction in dust with 0.3-1% moistening. The mixture was tested on standard equipment at a consumption rate of 0.5-0.6 cu m/hr or 3 liters of water per ton of coke with 0.08% of wetting agent; 0.3% moistening. Current tests are being made with a 7.5 liter/ton consumption rate and a 0.006 liter/ton wetting agent.

3706 APTIC NUMBER 13519

Gieseler, George A.
FILTERING APPARATUS. Dracco Corp., Cleveland, Ohio. U. S. Pat. 2,167,236. 4p., July 25, 1939. (Appl. June 17, 1938, 9 claims.)

This invention proposes a filtering apparatus which may be used with glass cloth filter bags which can withstand the SO2 and SO3 found in combustion gases without decomposing. The usual mechanical vibrating or shaking of bag filters cannot be withstood by glass filter bags. The filter apparatus of this invention employs a vibrating or shaking means attached to one end of the filter bag, while the opposite end of the filter bag is attached to a flexible diaphragm which acts in conjunction with the vibrating or shaking mechanism by alternately creating pressure

inside and outside the bag. This enables the bag to withstand the cleaning operation.

3707 APTIC NUMBER 13014

Goller, Edward S.
CARBURETOR CONTROL MEANS FOR INTERNAL COMBUSTION ENGINE.
(Assignee not given.) U.S. Pat. 3,446,194. 4p., May 27, 1969.
1 ref. (Appl. June 21, 1967, 8 claims).

Automobiles conventionally employ a butterfly valve in a carburetor to control flow of fuel to the automobile's engine. Upon deceleration, this butterfly valve is suddenly closed resulting in raw fuel being sucked into the engine. This raw fuel is not burned properly resulting in increased air pollution during deceleration. An invention is presented to provide means for automatically holding the butterfly valve open for a few seconds after deceleration is initiated to admit air into the carburetor downstream of the butterfly valve for forming a combustible mixture with the raw fuel hanging on the walls of the carburetor and intake manifold. The set screw which adjusts the idling speed of the engine is replaced by a solenoid having its armature normally extended to give the engine a faster-than-normal idle. The armature is automatically withdrawn to give the engine a normal idle 3 to 10 sec after deceleration has begun. This allows for combustion of the raw fuel which collected in the engine when the butterfly valve closed.

3708 APTIC NUMBER 12982

Government Industrial Development Lab., Hokkaido, Japan,
Smokeless Fuel Research Group
SMOKELESS FUEL FROM FINE COALS CARBONIZED IN A FLUIDIZED BED.
(Ryudo kanryu: Netsukan seikeiho ni yoru muen kotai nenryo no seizo shiken). Text in Japanese. Nenryo Kyokai Shi (J. Fuel Soc. Japan, Tokyo), 48(501):58-66, Jan. 1969. 13 refs.

Under conditions giving the maximum yield of solid products, solid smokeless domestic fuel of a moderate price from the cheaper fine coal is produced by mixing in a fluidized bed. Three sizes of beds were studied: 4, 10.5, and 40 cm. Properties of coal used, experimental apparatus, and experimental conditions are given in detail. Oxygen above the bed is directly proportional to temperature. The fine coal is carbonized at the mild temperature in a dense fluid bed with a mechanical stirrer and then the char, while it is hot, is continuousIy briquetted by a double-roll press without any binder. The fluidizing gas, which also contributes to the internal heating of carbonizer, does not require high velocities since a mechanical stirrer reduces the risk of agglomeration. The carbonizing temperature in a fluidized bed can be controlled automatically by regulating the coal input rate. The fluid bed temperature may readily be controlled to + or - 2 C. The qualities of briquettes depend both on the coal properties and the carbonizing conditions. The industrialization of the hot briquette process is feasible. The equipment is comparatively simple and suited to continuous automatic operation.

3709 APTIC NUMBER 13033

Griffing, Margaret E., Frances W. Lamb, and Ruth E. Stephens
METHOD OF CONTROLLING EXHAUST EMISSION. (Ethyl Corp., New York, N.Y.) U.S. Pat. 3,449,063. 4p., June 10, 1969. 5 refs. (Appl. May 13, 1966, 10 claims).

A method is presented for reducing unburned hydrocarbons, carbon monoxide, and nitrogen oxides of the exhaust gas from internal combustion engines operating at an air/fuel ratio of 15 by contacting the exhaust gases with oxygen, ammonia, and a catalyst. Additional oxygen is first injected into the exhaust stream. Ammonium carbonate is added and vaporized to ammonia by the heat of the exhaust gases. The ammonia, oxygen, and exhaust gases are then contacted with the catalyst at a temperature between 600 and 800 F. The catalyst consists of an alumina support impregnated with 0.001 to 25 wt % copper oxide and with 0.001 to 3 wt % palladium.

3710 APTIC NUMBER 13012

Grillot, R. and A. Ladan
A FEW METHODS USED IN FRANCE TO PREVENT ODOURS. (Quelques methodes utilisees en France pour la prevention des odeurs). Text in French. Pollut. Atmos. (Paris), 11(41):1-14, Jan./March 1969. 59 refs.

A consideration of the difficulty of establishing a scientific basis for the detection of pollution by odors is followed by a review of methods used in France to prevent odors. These include ventilation, adsorption, thermal and catalytic combustion, dry and wet processes, absorption, ozonization, and the use of masking and neutralizing agents. Characteristic examples of applications are given for each method together with available economic data. Factors interfering with the adaption of deodorization methods are the high cost of appliances and agents, the limited effectiveness of methods, and the absence of legislation on maximum contents. A classified bibliography is included. (Author abstract modified)

3711 APTIC NUMBER 13117

Guerrieri, Salvatore A.
GAS PURIFICATION PROCESS. (The Lummus Co., Inc., New York, N.Y.) U.S. Pat. 3,446,595. 4p., May 27, 1969. 3 refs. (Appl. March 17, 1966, 8 claims).

A continuous process for removing hydrogen sulfide from a gas stream is described. The H2S-containing gas is contacted with a liquid containing a stoichiometric excess of sodium bisulfite to produce a mixture of elemental sulfur, sodium sulfite, unreacted sodium bisulfite, and water. Oxygen should not be present during the reaction because it causes the formation of thiosulfate. The gas stream, free of H2S, is then recovered. The elemental sulfur is separated from the reaction mixture, and a portion is burned

to produce SO2. The remaining portion of the mixture is contacted with the SO2 to convert sodium sulfite and water to sodium bisulfite. This is recycled to the first contact step for reaction with additional quantities of H2S-bearing gas.

3712 APTIC NUMBER 13532

Nasche, Rudolph Leonard
SEPARATION AND RECOVERY OF GASES. (American Smelting and Refining Co., New York, N. Y.), U. S. Pat. 1,758,398. 3p., May 13, 1930. (Appl. Aug. 17, 1927, 5 claims).

A process is described for the separation of a gas which in the liquid state has a vapor pressure greater than atmospheric from a gas mixture. Sulfur dioxide removal from smelter gases is discussed as an example. Dust and fumes are removed from the smelter gas, and the gas is passed through silica gel. Sulfur dioxide is expelled from the gel by passing steam through. The steam is condensed in a primary condenser maintained at a sufficiently high temperature to prevent the absorption of excessive quantities of SO2. The SO2 is then passed through a second condenser at a lower temperature for further cooling and lowering moisture content. The remainder of the moisture is removed from the SO2 by passing the gas over sulfuric acid.

3713 APTIC NUMBER 13052

BREAKTHROUGH In COAL COMBUSTION. Heating Ventilating Engr. J. Air Conditioning (London), 42(503):626-628, June 1969.

By burning coal in a fluidized bed, there is the possibility of cost savings through reduction in size and complexity. This is because both the combustion intensity and the rate of heat transfer can be increased. Since the bed operates at a very low temperature, corrosion is also expected to be reduced. The sulfur in the coal, which is normally emitted in the flue gases, can be retained in the bed, thus reducing air pollution problems. Smoke emission from domestic heating installations using solid fuel is being reduced in two ways. The first is the development of premium solid smokeless fuels for use in open grates and closed stoves and boilers. The second is the development of new appliances capable of burning cheap, highly volatile coals smokelessly. Investigations are also being conducted to find new uses and to increase the value of the by-products from coal, and to find and develop non-fuel uses for coal itself.

3714 APTIC NUMBER 13156

Herber, Horst, Werner Hagen, and Wolfgang Schroeder
SEPARATING VAPOROUS ALDEHYDES FROM OFFGAS OBTAINED IN THE OXO PROCESS. (Badische Anilin- & Soda-Fabrik A. G., Ludwigshafen (Rhine), Germany.) U. S. Pat. 3,455,091. 2p., July 15, 1969. 2 refs. (Appl. Nov. 21, 1967, 11 claims).

The invention described provides a method for separating more than 90% of the vaporous aldehydes formed in the oxo process by scrubbing the exhaust gas at atmospheric pressure with relatively small amounts of solvents. It eliminates the disadvantages of using water as the scrubbing liquid. Solvents used contain a high-boiling oxonation product (i.e., products of the oxo reaction) and/or a high-boiling hydrogenated oxonation product. Preferred high-boiling oxonation products are obtained as residue from the processing of hydrogenated oxo products. They consist essentially of higher aldehydes, acetals, carboxylic esters, and higher alcohols. The main product of the oxo reaction, butanol or n-propanol, for example, is also suitable provided its boiling point is above 95 C. Another advantage of the process is that the solution containing aldehydes can be processed together with the bulk of the oxonation products. Alcohols suitable for the production of plasticizers may be prepared from the aldehydes recovered.

3715 APTIC NUMBER 12995

High, Carl F.
ANTIAIR POLLUTION INTERNAL COMBUSTION ENGINE. (Assignee not given.) U. S. Pat. 3,455,284. 8p., July 15, 1969. 9 refs. (Appl. Aug. 24, 1967, 23 claims).

A new crankcase ventilation system for automotive internal combustion engines that corrects the deficiencies of previous systems is discussed. A ram-air scoop at the air intake of the engine provides air for purging the crankcase in proportion to engine speed and load. Venturi action at the carburetor provides the necessary vacuum for exhausting the fumes from the crankcase. A means is provided for reducing the vacuum when the throttle valve approaches a closed position, as during idling or when the engine is under light loads. Carbon, decomposed lead, resins, and silica are removed from the gases before they enter the engine intake system. This is accomplished by providing a tortuous passage lined with an adhesive surface through which the gases must pass before entering the carburetor.

3716 APTIC NUMBER 13221

Higuchi, Masataka
ABOUT HS BAG-FILTER. (HS-baggu fuiruta ni tsuite). Text in Japanese. Kuki Seijo (Clean Air-J. Japan Air Cleaning Assoc., Tokyo), 6(2):48-53, June 1968.

The characteristics of HS bag filters are reviewed. The 'Dustop' is a ductless, movable, and compact filter requiring only a small installation area. It is available in two versions designed to treat dusts at 8 and 25 cu m/min. The BT-type bag filter is a high-efficiency filter with a reverse air cleaning system. Cleaning is automatic and the filter is compact. Collected dusts are dropped by reverse air flow and by the vibration of the duster engine. The Baghouse collector processes large concentrations of dust at temperatures as high as 500 F. Collected dusts are easily dropped due to a silicone-treated filter, and cleaning is automatic. This collector can be used to treat the 'red smokes' produced in oxygen steel furnaces. A bag filter for polluted atmospheres is designed to

clean compression inlet air; its filtration rates are 2 to 4 cm/sec.

3717 APTIC NUMBER 13184

Hino, Yoshinori
THE MECHANISM OF COAL DESULFURIZATION OF COAL IN A STREAM HEATING. (Sekitan no ryudo kanetsu ni yoru datsuryu kiko). Text in Japanese. Netsu Kanri (Heat Engineering, Tokyo), 21(4):26-31, April 1969. 20 refs.

An hypothesis is proposed for a two-stage process for the desulfurization of coal in a hot gas stream. A preparation stage and a chemical reaction stage constitute the process. Experimental results suggest that desulfurization increases as the vaporization time of gas decreases, as the size of the coal particles decreases, and as reaction time increases. Good results are obtained at a reaction time of 20 min. Water vapor should be included as a catalyst in the desulfurization . The rate of desulfurization depends on the decomposition rate of the organic compound and the diffusion rate. In the preparation stage, a porous reaction surface is produced. Its area increases as the evolution of gas from coal increases and as the heat added to coal increases. In the reaction stage, the following reactions between various types of sulfur and the stream gas occur: 4 FeS2 + 11 O2 yields 2 Fe2O3 + 8 SO2 in the presence of water for an oxidizing gas; FeS2 + X S(organic) + X H2 yields Fe + X H2S for a reducing gas. With the desulfurization gas, the reaction surface increases by the following reactions: 2 C + O2 yields 2 CO (oxidizing gas); C + 2 H2 yield CH4 (reducing gas).

3718 APTIC NUMBER 13447

Hoag, D. S.
ANALOG COMPUTER CONTROL OF A KAMYR DIGESTER. Tappi, 47(12):734-741, December 1964. 1 ref.

The principles of applying an analog computer to control an industrial process are discussed and illustrated with a specific example. The Honeywell RDC 2020 analog computer has been developed to control a Kamyr digester during changes in wood species, production rate, permanganate (K) number, and alkali-to-wood ratio. It can also be used to correct for K number drift during steady state operation. Verification of a semitheoretical math model of the Kamyr cooking process and determination of its coefficients was made by extensive planned testing on an operating digester. The computer has been calibrated and tested for both southern pine and mixed hardwoods with considerable success. Some mill operating experience has been obtained cooking pine chips.

3719 APTIC NUMBER 13905

Hoffman, George A.
FUTURE ELECTRIC CARS. Preprint, Society of Automotive Engineers Inc., New York, 6p., 1969. 11 refs. (Presented at the International Automotive Engineering Congress, Detroit, Mich., Jan. 13-17, 1969, Paper 690073.)

The adoption of battery-operated cars by the turn of the century could be a less costly control of automotive air pollution than the suppression of most of the emissions from the internal combustion engine. However, another 30 or 40 years must elapse before electric cars could outnumber combustion engine cars on our roads, due to the research, development, acceptance, and manufacturing problems. Permitting only nonhazardous batteries in future electric cars downgrades their performance and top speed capabilities to mediocre levels. On the other hand, acceptance of the fused-salt electrochemical energy storers would allow performances and speeds comparable to those of contemporary intermediate-size domestic models. The range of future electric cars is unrelated to frequency of home-charging, if fast battery exchange schemes were to be available at service stations. The difficult transition from today's internal combustion engine to the next century's all-engine power system might be accomplished with the least disruption by hybrid vehicles whose powerplant is a small gas turbine driving a generator, and whose electric traction motor is powered by both the generator and the storage battery. (Author summary modified)

3720 APTIC NUMBER 13663

Holbrook, E. A.
THE UTILIZATION OF PYRITE OCCURRING IN ILLINOIS BITUMINOUS COAL. Ill. Univ. Bull., Circ. 5, 14(51), 46p., Aug. 20, 1917.

Pyrite occurring in Illinois bituminous coal is usually rejected as a deleterious impurity. Its heating value is small, and the sulfur dioxide gas formed from its combustion with water vapor forms an acid corroding boiler flues and stacks. Experiments were performed with commercial-scale equipment at the University of Illinois to develop a simple washing or ore-dressing process for recovering clean pyrite with coal as a by-product. The power required and the 1912 cost of operation, as well as of capital investment, were determined for a plant capable of preparing nearly pure pyrite and commercial coal comparable to ordinary screenings. The tests indicate that the separation of pyrite from coal presents no problem when performed by crushers, screens, and concentrating machines adapted to ordinary ore-dressing work. An average plant will recover 81% of the pyrite in coal. If the middlings product from the jig are crushed and retreated, recovery will be increased by about 6.4%. This pyrite will average more than 40% sulfur. The successive steps essential for complete treatment are illustrated. The amount of coal recovered is considerable, averaging 18 to 20 t/day. It is emphasized that ordinary coal-crushing machinery is not suitable for crushing raw pyrite. Only breakers designed for hard rock should be used. Separation of pyrite and coal is accomplished by a simple, revolving screen. A considerable proportion of the crushed ore contains fine pyrite, and this is separated by an ore-concentrating table. A process is included for recovering and cleaning sludge water.

3721 APTIC NUMBER 13258

Hollander, Fgon
REDUCTION OF NITROGENOUS GASES BY CHARCOAL. (Redukcia nitrozaych plynov drevenya uhlim). Text in Czech. Chem. Prumysl, 15(8): 498-500, 1965. 9 refs.

Modern methods of reducing nitrogen oxides from emissions of industrial plants use catalytic reduction of nitrogen oxides with combustible gases. In the experiments reported, complete catalyst-free reduction of nitrogen oxides to elementary nitrogen was accomplished by the use of charcoal. The gases were fed to a quartz reduction tower filled with preheated granular charcoal followed by washing with an indicator solution of alpha-naphthylamine, sulfanilic acid, and sodium acetate; drying with calcium chloride, a flow meter, and a dry air pump. Judged by the high sensitivity of the indicator, the efficiency of the process can be considered 100%. The remaining ash has a porous structure which does offer noticeable resistance to the gas passing through it. At gas speeds of 0.08 or 0.15 m/sec the consumption of charcoal is 40 kg/1000 cu m of incoming gas. The upper limit of speed for a grain of 3 to 4 mm is 0.29 m/sec. At higher speeds the consumption of charcoal doubles. The method is applicable to any industrial process in which nitrogen oxide concentration is less than 50 mg/L of waste gases. The possibilities exist of adapting it to batch processes and of utilizing the generated heat of reaction. A minimum of equipment is required, and water is not produced as a by-product.

3722 APTIC NUMBER 13389

Idel'chik, I. E. and V. P. Aleksandrov
DESIGNING FLUE GAS ADMISSION AND DISCHARGE SYSTEMS FOR THE ELECTROSTATIC PRECIPITATORS IN 300 MW UNITS. Thermal Eng. (English translation of: Teploenergetika), no. 11:93-98, 1968. 1 ref.

The selection of a system of inlet and outlet sectors between the headers and an electrostatic precipitator (ESP) and a system for supplying gases directly to the distributing header and removing them from the collecting header are discussed. The efficiency of an electrostatic precipitator was found to be considerably affected by the uniformity of flow distribution and the concentration of dust, both over the cross-section and in the separate sections of units. Uniformity of flow and concentration of particles suspended in it depends on the correct selection of the gas distributing units, the inlet and outlet sectors nearest the ESP, the distributing and collecting headers, and the system whereby flow is supplied to the distributing headers and removed from the collecting headers. The gas distribution units before the ESP and the inlet and outlet sectors joining directly onto it should be treated as a single unit. The arrangement of the ash-removing units should be evolved simultaneously with that of the boiler in thermal power stations, so that early account can be taken of the main requirements for conditions of admitting and discharging the gases entering the precipitator and the flue gas ducts.

3723 APTIC NUMBER 13115

Iinoya, Koichi
SELECTION OF VARIOUS TYPES OF DUST COLLECTOR. (Jojin sochi no sentei). Text in Japanese. Kuki Seijo (Clean Air-J. Japan Air Cleaning Assoc., Tokyo), 6(6):1-7, 1969. 7 refs.

Various types of dust collecting devices were discussed with respect to their costs, considering construction and operating costs, and performance, i.e., energy consumption (pressure loss) and collection efficiency. Dust collectors generally in use in industry at the present time were investigated, including inertia vessels, cyclones, bag filter drying systems, a fiber-packed bed filter, a water precipitator, and an electrostatic precipitator. The scrubber or cyclone was found to be most widely used. The bag filter was determined most effective as a drying system only, whereas the electrostatic precipitator worked well with both wet and dry systems. It was suggested that the best efficiency would be found with the electrostatic collector. A fiber-packed bed filter or a two-stage electrostatic filter was most highly recommended as an air filter.

3724 APTIC NUMBER 13869

Indrigo, R. and G. Klun
EXPERIMENTAL RESEARCH ON SEPARATING EFFICIENCY OF A WET DUST COLLECTOR. (Ricerca sperimentale sull 'efficienza di separazione di un depolveratore a umido). Text in Italian. Tec. Ital., 33(5):321-329, May 1968. 6 refs.

The research plant and devices employed in the investigation on the separating efficiency of a wet dust collector are described. The effect of variations of air delivery, dust concentration at inlet, and water level, on the efficiency and pressure losses of the collector are examined, and the optimum working conditions are reported in relation to the talc industry. Application of the wet dust collector in various fields of industry is discussed in relation to a forthcoming air pollution law. (Author summary modified)

3725 APTIC NUMBER 13036

Innes, William Beveridge
CATALYTIC MUFFLER. (American Cyanamid Co., Inc., Stamford, Conn.) U.S. Pat. 3,449,086. 4p., June 10, 1969. 5 refs. (Appl. Sept. 22, 1964, 1 claim).

A catalytic muffler for the control of hydrocarbons emitted in internal combustion exhaust gas is presented. The muffler is of simple construction, readily adaptable for positioning in the exhaust line and is designed to minimize the destructive fluidization of the catalyst particles which has been prominent in previous catalytic mufflers. This catalytic muffler is of the radial type with the annular catalyst located between a central foraminous gas-distributing pipe and an outer cylinder retaining sleeve. Fluidization of the catalyst is prevented by having an unperforated retaining sleeve top.

3726 APTIC NUMBER 13155

Ito, Mikiji and Ikuo Okuda
DRIVING DEVICE FOR AN AIR PUMP FOR PURIFYING EXHAUST GAS. (Nippon Denso Kabushiki Kaisha, Kairya-shi, Japan.) U. S. Pat. 3,455,105. 4p., July 15, 1969. 2 refs. (Appl. Oct. 25, 1966, 2 claims).

A device for purifying exhaust gases of an internal combustion engine exhaust line includes an air pump for discharging secondary air to the exhaust lines to oxidize the unburned exhaust gases. The pump drive shaft is connected to an input shaft driven by the engine so that it normally rotates at a speed ratio of 1:1 when the engine speed decreases below a predetermined amount. Suitable control means are provided, however, to engage either a mechanical gearing or a clutch mechanism to rotate the pump shaft at a slower speed when the speed of the engine increases above a predetermined value. (Author Abstract)

3727 APTIC NUMBER 12964

Iwabuchi, Koichi, Isaho Hayashi, and Fumio Koyama
STANDARD DRAFT FOR THE DUST COLLECTOR EFFICIENCY TEST FOR AIR VENTILATION. (Kankiyo jojinsochi no seino shiken ni kansuru kijun an). Text in Japanese. Kuki Seijo (Clean Air-J. Japan Air Cleaning Assoc., Tokyo), 6(1):1-17, April 1968.

Standards for testing the efficiency of dust collectors for air ventilation are discussed. Preliminary characteristic and installation tests were run on the system, excluding the primary air filter. The efficiency test on the actual filter included measurement of pressure drop, dust collection ratio, and amount of collected dust. The dust collection ratio is defined as the dust concentration at the input minus the dust concentration at the output, divided by the input dust concentration. Equipment used in the efficiency test included a dust feeder, a means to alter flow direction, an air velocity control, a tube to measure space velocity, a blower, and appropriate connections for the filter. A pitot tube or individual orifices were used to measure flow rates. Pressures in the system were measured with manometers. A static electrical dust sampler and a balance were used for collected dust evaluations. Test conditions included a dust feed rate of 20 mg/cu m at a space velocity of 1.5 m/sec. Three test dusts were used. The dust feeder was either an API or an SAE type.

3728 APTIC NUMBER 12655

PRODUCT GUIDE 1969. DIRECTORY OF AIR POLLUTION PRODUCTS LISTS MANUFACTURERS OF EMISSION CONTROL EQUIPMENT AND AIR POLLUTION INSTRUMENTATION. J. Air Pollution Control Assoc., 18(12): 847-857, Dec. 1968.

This directory of air pollution products lists manufacturers under product classifications within the two major categories of emission control equipment and air pollution instrumentation. In addition the guide contains an alphabetical listing of manufacturers with mailing addresses.##

3729 APTIC NUMBER 13198

Jefferis, George C. and J. D. Sensenbaugh
EFFECT OF OPERATING VARIABLES ON THE STACK EMISSION FROM A MODERN POWER STATION BOILER. Preprint, Am. Soc. Mech. Engrs., Paper 59-A-308, 8p., 1959. 9 refs. (Presented at the Annual Meeting of the Am. Soc. Mech. Engrs., Atlantic City, N. J., Nov. 29-Dec. 4, 1959.)

A series of tests on stack emission from an oil-fired boiler are described. The effects of windbox air admittance, oil temperature, burner tilt, excess air, and gas recirculation on the dust loading, the combustible content of the dust, and the concentration of nitrogen oxides were studied. In the first series of tests, closing the main air dampers slightly and opening the auxiliary dampers quickly produced large increases in dust loading and combustible content. When a wider range of damper settings was used, the dust-loading curve did not rise as sharply, and the combustible content was constant over the entire range of damper settings. The NO concentration decreased as the main air dampers were closed and the auxiliary ones opened. Increasing the oil temperature by 35 F halved the dust emission and reduced the combustible portion by 15 to 17%. The nitrogen oxides showed a decreasing tendency with increasing oil temperature. With excess air, the dust was reduced by 20%, and the combustible content by 17%. However, increasing the oxygen percentage increased the nitrogen oxides from 184 to 258 ppm. Burner tilt and gas recirculation appeared to be interrelated, since the dust loading increased with increasing gas recirculation at zero tilt. Other tests at positive tilts with varying gas recirculation gave a constant dust loading. The combustible content was little affected by the quantity of recirculated gas, and the nitrogen oxides concentration decreased with increasing gas recirculation.

3730 APTIC NUMBER 13181

Jessnitz, W.
OIL REMOVAL FROM HOT COMPRESSED AIR. (Entolung heisser Druckluft). Text in German. Wasser Luft Betrieb, 13(5):176-179, May 1969.

In the production of compressed air by pistons or rotary compressors, the air is heated at 8 kg force/sq cm to about 160 C. Oil used for lubricating these compressors is carried along in the compressed air. Due to the high temperature at the point of friction between cylinder and piston, the oil is partly cracked so that highly flammable oil soot and oil coke particles are also formed. According to the latest regulations concerning accident prevention, 90% by volume of these oily pollutants must be removed. An electrostatic precipitator developed especially for this purpose was recently tested, and a total collection efficiency of 95% was obtained. It has now operated for three years in a forgery and removes oily particles from three rotary

compressors. An average collection efficiency of 90% has been obtained over the three years. This precipitator comes in five sizes: 280 to 720, 1080 to 1520, 1880 to 2300, 2800 to 3700, and 4300 to 6000 std cu m/hr. These sizes match the commercially available compressors. The filter must be opened, and if necessary cleaned, in intervals of six months.

3731 APTIC NUMBER 13116

Jewell, Douglas M. and Joseph P. Yevich
PROCESS FOR REMOVING SULFUR, OXYGEN AND NITROGEN COMPOUNDS FROM PETROLEUM DISTILLATES. (Gulf Res. and Dev. Co. Inc., Pittsburgh, Pa.) U. S. Pat. 3,446,729. 5p., May 27, 1969. (Appl. Nov. 2, 1966, 10 claims).

Calcium hexammine (Ca(NH3)6) is used to remove heterocyclic S, O, and N compounds as well as other S, O, and N compounds present in petroleum distillates. A suspension of Ca(NH3)6 in an inert, non-polar solvent is prepared and contacted with the hydrocarbon to be treated. The resulting solid materials can be filtered off and the solvent can be stripped from the purified hydrocarbon fraction. The calcium hexammine can be maintained in the solid state by the proper selection of temperature and pressure. Temperatures at or below ambient and atmospheric pressures are suitable. Hydrogen added to the Ca(NH3)6 reagent increases the impurities removed by the solution. The limitations on the amount of impurity removed are governed only by the stoichiometric amounts of calcium hexammine employed and the individual chemical characteristics of the impurity being removed. Suitable feed stocks for the process include furnace and gas oils. Preferred stocks are those which have been pretreated to reduce the S, O, and N content, such as hydrogenates or hydrofined feed stocks.

3732 APTIC NUMBER 13029

Johswich, F.
WASTE GAS DESULFURIZATION. IMPORTANCE AND PRACTICAL USE. (Abgasentschwefelung. Bedeutung und praktische Moglichkeiten). Text in German. Brennst.-Warme-Kraft, 14(3):105-115, March 1962. 21 refs.

Neither fuel desulfurization nor high stacks are sufficient for solving the problem of ever more SO2 emitted into the atmosphere. The need for an effective and economical waste gas desulfurization method is pressing. Of the numerous dry and wet desulfurization processes, none works really satisfactorily. The wet processes, e.g., the Fulham-Simon-Carves method and the sodium sulfite/bisulfite-zinc oxide method, have the disadvantage that the SO2 scrubbing process is accompanied by a heat exchange between gas and scrubbing fluid. As a consequence, the gas leaves the scrubber saturated with water vapor and cools further, which leads to caking and lack of thermal buoyancy so that the smoke plume touches ground level too soon. The dry methods usually operate on the principle of SO2 absorption or adsorption on aluminum oxide, manganese oxide, silica gel, and activated coal. The main disadvantage of the absorption methods are the high costs. Of the adsorption methods, the Reinluft process seems to be the most promising one. It operates on the principle of SO2 adsorption and oxidation to SO3 in the presence of oxygen. Through subsequent hydration, SO3 is converted into sulfuric acid. Instead of activated coal the Reinluft process uses semi-coke, which is activated by soaking in sulfuric acid and driving off the acid at 400 C. Investment costs are 4,300,000 DM (1962) for fuel oil with 2% S and 4,500,000 DM for fuel oil with 3.5% S. As with any gas cleaning system, the space requirement is large. No special stack is required. The process can also be used for gases which contain H2S, COS, or CS2.

3733 APTIC NUMBER 13302

Kane, Frank A., Jr.
DEVICE FOR CONTROLLING THE ADMISSION AND COMBUSTION OF FUEL IN AN INTERNAL COMBUSTION ENGINE. (Girard P. Oberrender, New York City, Emanuel H. Posnack, New York City, and Frank A. Kane, Jr., Monrovia, Calif.) U. S. Pat. 3,446,195. 17p., May 27, 1969. 4 refs. (Appl. Dec. 8, 1967, 30 claims).

A device for controlling the admission and combustion of fuel in an internal combustion engine effects reductions in unburned hydrocarbons, CO, and nitrogen oxides in automobile exhaust emissions. An electromechanical system, which is responsive to engine speed, controls spark and air admission. The spark is advanced during deceleration, cruising, and partial throttle speeds. The spark and air controls are combined with an idler shut-off and float bowl pressure control means for preventing the introduction of unduly rich gas mixtures during deceleration. Means are provided for restoring normal retarded spark timing and air-fuel ratios required for acceleration and full power operation. The electromechanical system operates instantly and without the danger of stalling.

3734 APTIC NUMBER 13645

Kawasaki Ironworks, Japan, Mizushima Branch Power Dept., Fuel Sect.
PREVENTION OF AIR POLLUTION BY COMBUSTION CONTROL IN MIZUSHIMA IRONWORKS. (Mizushima seitetsusho ni okeru taikiosen boshi no taseno nensho kanri). Text in Japanese. Netsu Kanri (Heat Engineering, Tokyo), 21(4):10-15, April 1969.

One of the most important industrial hazards to the public produced by ironworks is sulfur oxides in their emissions. At the Mizushima Ironworks, both dry and wet methods, including E. P., V. S., I. C. and Multicyclone systems, have been adopted to reduce dust concentrations. Their purification rates range from 95 to 99.95%. Special attention is paid to proper combustion and ventilation conditions. The combustion control system is checked routinely for minor inadequacies and malfunctions. The addition of 'Tenkazai' to heavy oil also reduces the production of polluted gas caused by water-separating and sludge-distributing effects. However, this procedure is not always economically feasible. To control smoke dispersion, the layout of factory buildings must be considered in relationship to local weather conditions. Buildings producing less smoke should be constructed closer to residential areas, while those

producing large amounts should be placed perpendicular to the direction of the wind, so that smoke from one building will have less chance of mixing with that from another. To distribute smoke over a wider area thereby diluting the polluted air, high chimneys, high gas temperatures, and ways of accelerating smoke velocities should be considered.

3735 APTIC NUMBER 13578

Kenkyusho, Kogyo Kaihatsu
A PROCESS FOR ELIMINATING SULPHUR OXIDES FROM COMBUSTION EXHAUST GASES. Brit. Pat. 1,098,557. 6p., Jan. 10, 1968. (Appl. May 18, 1966, 6 claims.)

A method is described for eliminating sulfur oxides from combustion exhaust gases by passing them over activated carbon. The activated carbon is subjected to a three stage treatment comprising an absorption stage, a washing stage in which the absorbed sulfur oxides are removed, and a drying stage. In the drying stage, the sulfur oxides to be removed are divided into two streams, one of which is used continuously for drying. Part of the sulfur oxides in this stream are absorbed by the activated carbon being dried, and the outlet gas from this stage, with a lower temperature and lower concentration of sulfur oxides, is mixed with the second gas stream to produce a mixture of a suitable temperature for the adsorption stage. The temperature of the gas stream entering the adsorption stage should be less than 130 C. It is suggested that a coke layer be provided at the upstream side of the activated carbon to remove any soot or ash in the exhaust gases which might lead to obstruction in the layer of activated carbon. This process may be used by electric power stations where heavy sulfur-containing oils are burned, and by other industrial plants.

3736 APTIC NUMBER 13818

Khobe, Ryuzo
A NEW AIR FILTER, 'AIR TANANON'. (Tanachi no kuki seijoki 'ea tananon'). Text in Japanese. Kuki Seijo (Clean Air-J. Japan Air Cleaning Assoc., Tokyo), 6(3):63-64, Aug. 1968.

An oxidizing catalyzer used as a filter in this new equipment has better efficiency in removing harmful gases (such as SO2, H2S, and Cl2) in the air than activated carbon (about ten times as effective as activated carbon for SO2 gas). The 3 cm-thick filter is entirely made of staple fiber, with an oxidizing catalyzer cover. Surface area is large (1200 sq cm), loss of air pressure through the filter is insignificant (1.5 mm H2O), and the size and weight of the equipment is small (34 x 55 x 13 cm, 4 kgm). Therefore, it can be used both in homes and factories where the air is significantly polluted. This equipment also removes more than 80% of other dust, including both large- and small-diameter particles, but cannot remove CO gas satisfactorily.

3737 APTIC NUMBER 12976

Kimura, Norio
DUST COLLECTION MECHANISM OF AIR FILTER. (Kuki roka no jojin kiko). Text in Japanese. Kuki Seijo (Clean Air-J. Japan Air Cleaning Assoc., Tokyo), 6(6):8-17, 1969. 34 refs.

This paper deals with the separation of fine dust particles by fibrous mats and defines the collection mechanism of aerosol particles and the methods used to predict the aerosol filtration performance. A formula for the collection ratio of fibrous mats is shown for a single cylinder unit. In general, particles are collected by collision in the cylinder when its inertia deviates from the flow course as the aerosol approaches. However, the width of the aerosol stream depends on particle size and other factors influence the collection structure that separates particles from the current. Depending on current velocity, particle diameter, or induction power, particles are collected by blocking, diffusion, static electricity, or the polarizing action of a particle. A method is presented for calculating the average fiber diameter.

3738 APTIC NUMBER 13160

Kita, Nobuyuki and Yoshiya Fuse
EXPERIMENTS TO INHIBIT NITROGEN OXIDES DEVELOPED WITHIN THE EXHAUST SYSTEM OF DIESEL ENGINES. (Diesel haiki gasu chu no chisso sankabutsu no hassei yokusei ni tsuite no 2, 3 no jikken). Text in Japanese. Nenryo Kyokaishi (J. Fuel Soc. Japan), 48(504):241-249, April 1969. 10 refs.

Nitrogen oxides are the main components of harmful gases which develop within the exhaust system of diesel engines. Experiments were performed using a one-cylinder Fulperland F-2 diesel engine (compression ratio of 22, 3 horsepower, 1500 rpm). Nitrogen monoxide and dioxide were measured by Salzmann's method. Concentration of nitrogen oxides ranged from 180 to 550 ppm; the more the load on engine, including the number of rotati rotations, the more was the concentration of nitrogen oxides with the maximum concentration of 1200 rpm. The ratio of nitrogen dioxide to nitrogen oxides decreased with the increased load on the engine, and was not influenced by the number of rotations. The development of nitrogen oxides was effectively inhibited by sending the exhaust gas partially back to the pre-engine combustion chamber. Nitrogen oxides were slightly inhibited by increasing negative pressure within the engine chamber. However, engine power was decreased by this procedure. By delaying the fuel injection time, formation of nitrogen oxides was slightly inhibited without decreasing the engine power. To confirm these results, these experiments should be repeated using a larger diesel engine.

3739 APTIC NUMBER 13113

Knop, W.
AIR POLLUTION CONTROL IN NON-FERROUS METAL INDUSTRIES. III. TECHNICAL METHODS OF AIR POLLUTION CONTROL. (Luftreinhaltung in NE-Metall-Betrieb, Teil III. Technische Massnahmen zur Luftreinhaltung). Text in German. Metall, 23(2):183-189, Feb.

1969. 44 refs.

Selection of suitable air pollution control facilities for nonferrous metal industries is determined by such factors as the required collection efficiency and the dust concentration of the dirty gas. There are three main ways of dust elimination open to such industries, namely dry and wet dust separation and afterburners. For dry dust collection, settling chambers, inertial and centrifugal separators, bag filters, electrostatic precipitators, and adsorbers are available. Settling chambers are employed for collection of large grains (up to 100 microns), as found in the flue gases of copper smelting plants. Inertial separators can be used for waste gas temperatures up to 350 C. Cleaned gas dust concentrations of as low as 50 mg/cu m can be attained with them. Such devices have been successfully used in sieving and crushing stations and in secondary light metal plants for collection of finest dusts and mists. In roasting stations, centrifugal separators are mostly used. Centrifugal separators are, moreover, frequently used for preliminary separation of coarse dust particles. Bag filters are used to retain mists developing in galvanizing stations. Electrostatic precipitators are used more and more in copper smelting plants, in sintering plants, at shaft furnaces etc., because of their high collection efficiency and because of the stringent regulations concerning emissions. To prevent organic vapors from escaping into the atmosphere, adsorption by activated coal is used. For water soluble components in the flue gases, wet collectors must be used. Finally, mention must be made of a new type of furnace for the recovery of 15 tons of copper from used cables which will operate smoke-free. The flue gases will be completely burned by afterburners at temperatures between 900 and 1000 C.

3740 APTIC NUMBER 12802

Koglin, Waldemar
THE LOAD DEPENDENCE OF ELECTROSTATIC PRECIPITATORS. Staub (English Translation), 28(10):10-15, Oct. 1968. 9 refs.
CFSTI TT 68-50448/10

Extensive investigations into the problem of characteristics of electroprecipitators have given the following results: (1) The turbulence in an electroprecipitator is so high that no selective separation occurs depending on particle size diameter. (2) The apparent migration velocity in a given system depends on gas velocity. (3) The apparent migration velocity does not depend on dust content of untreated gas, but it certainly depends on the average particle diameter. It is, however, possible that in the case of wet electroprecipitators coagulations occur as a function of dust content of untreated gas. (Author's Summary)

3741 APTIC NUMBER 13819

Konno, Koiichi
HIGH EFFICIENCY AIR FILTERS. (Koseino ea firuta). Text in Japanese. Kuki Seijo (Clean Air-J. Japan Air Cleaning Assoc., Tokyo), 6(4):15-26, Oct. 1968.

Information regarding the mechanisms, shape, size, efficiency, and evaluation is included. Important mechanisms of a high-efficiency air filter in removing small dust of less than 1 micron in diameter are adsorption with filtration by the filter material itself. Materials used are asbestos with cellulose, glass-wool, plastic fiber, or celanese. The most effective thicknesses are 30 and 15 cm, and the cut-surface area is between 200 x 200 and 610 x 610 sq mm. Filter material is folded accordion-like 60 to 80 times as a separator to widen the dust-absorbing surface. The frame is attached to the filter very tightly with polyester silicate to avoid leakage. Efficiency of the filter depends mainly on its dust-collecting efficiency as measured by the AFI (Air Filter Institute) dust-spot test, which uses Arizona sand and carbon black 25 (0.08 micron in diameter); the N. B. S. (National Bureau of Standards) dust-spot test, which uses methylene blue (0.2-2.0 microns); and the D. O. P. test, which uses D. O. P. gas particles (0.3 micron in diameter). Every high-efficiency air filter must pass the D. O. P. test to ensure a collection ratio of better than 99.9% for small dust (0.3 micron in diameter). Pre-filters of lower efficiency are used to protect the high-efficiency filter from large dust particles. HEPA filters which are used in Japan are Absolute air filters (Cambridge Filter Co. and Franders Filter Co.), Ultraaire filter (MSA Appliana Co.), Artrocel (American Airfilter Co.), Microsorb Air filter (Delbag Airfilter Co.), Yokes absoluto filter (Yokes Ltd.), and others made in Japan.

3742 APTIC NUMBER 13094

Koutnik, Josef and Pavel Novotny
FLUID-BED COMBUSTION OF COAL FOR DE-SULPHURIZING THE COMBUSTION PRODUCTS. (Fluidni spalovani uhli z hlediska odsireni spalin). Text in Czech. Energetika (Prague), 19(6):222-228, 1969. 10 refs.

Trapping sulfur dioxide during solid fuel combustion in furnace hearths of heat plants poses one of the most topical engineering and economic problems in Czechoslovak power engineering. At the present time, considerable attention is being devoted abroad to a new combustion technique, fluid-bed combustion, mainly because it makes possible the trapping of sulfur dioxide by employment of the additive process. Information on the first international conference on fluid-bed combustion, which was largely concerned with desulfurization, is presented. The conference was held on Nov. 18 to 22, 1968 and was organized by NAPCA. The results reported at the conference promise an effective and simple method for limiting sulfur emission. (Author abstract modified)

3743 APTIC NUMBER 13243

Kriz, Milan
DRY METHOD FOR REMOVING SULFUR OXIDES FROM CHIMNEY SMOKE. (Suche zpusoby cisteni kourovych plynu od kyslicniku siry). Text in Czech. Sklar Keram., vol. 15:374-376, 1965. 25 refs.

In 1952, the total emission of sulfur dioxide in Czechoslovakia reached approximately 2 million tons per year. With the

building of electric power plants, where the primary source of energy is brown coal with a high content of sulfuric acid, this figure is growing. In new projects, 25% of the total cost is for installation of devices to reduce harmful emissions. The 'wet' removal process cools the emissions, thus reducing their ability to rise and be dispersed in the atmosphere. The latest trend is to use a 'dry' process which will remove the sulfur oxides at the temperature of emission. Three dry methods are commonly used: adsorption with metal oxides, adsorption of oxides on carbon, and catalytic oxidation. These methods are described and examples are given. Because all methods are technically difficult to achieve and expensive, it is concluded that there will probably never be an economic means of reducing power-plant emissions. However, because of the threat of emissions to the population, an economic method must continue to be sought.

3744 APTIC NUMBER 12962

Langhoff, Josef and Werner Peters
POSSIBILITIES AND EXPERIMENTS TO REDUCE THE SULFUR CONTENT IN COKE. I. (Moglichkeiten und Versuche zur Verminderung des Schwefelgehaltes im Koks. I). Text in German. Brennstoff-Chem. (Essen), 50(5):149-154, May 1969. 11 refs.

To produce low-sulfur iron, the sulfur in the coke must be removed. There are three ways to do this: by electrostatic or magnetic separation from the coal, by treatment with reagents or decomposition by bacteria; secondly during the coking process; and thirdly treating the coke by thermal decomposition or by treatment with reagents. Of all the methods, desulfurization during the coking process seems to be simplest and most effective. Experiments brought best results in a fluidized bed reactor with H2 as carrier gas. Fine grained coal (anthracite) with a sulfur content of 1.0% coked in a fixed bed furnace yielded coke with 0.88% sulfur. Fluidized bed desulfurization yielded cokes with 0.74% sulfur with H2 as carrier gas, 0.65% with illuminating gas, and 0.36% in an atmosphere of pure hydrogen. To determine the influence of H2, experiments were performed with an H2/H2S mixture. In order to obtain a maximum desulfurization, the ratio H2S/H2 may not exceed a value of about 0.001. The organic sulfur was hardly decomposed at this point. Fluidized bed experiments with larger-grained types of coal clearly showed the effect of the H2S concentration. In the zones of lowest H2S concentrations, the highest desulfurization was observed. There are two ways to limit an H2S recombination - first by increasing the throughput, and secondly by prolonging the residence time. To increase the H2 concentration, the pressure must be increased, which in the case of fluidized beds leads to construction difficulties. Thus, experiments in fixed beds were performed with the result that at a higher pressure the organic sulfur could be reduced from 0.75% to 0.2% at 10 atm and to 0.1% at 40 atm. Decomposition of sulfides was independent of the pressure.

3745 APTIC NUMBER 13845

Lasserre, P.
THE DEVELOPMENT OF FILTER AND DUST COLLECTING INSTALLATIONS. (La depoussierage evolution des depoussiereurs). Text in French. Chim. Ind. (Paris), 101(7):865-870, April 1969.

The emission of solid, liquid, or gaseous pollutants from industrial sources is activated by operations such as the grinding of minerals and pigments, the transport of powdery substances on conveyor belts, cutting, casting, or polishing and by the emission of vapors from smelters or mists from chemical and electrolytic baths. The pollutants pass through chimney hoods, cracks, or airshafts near the point of their production to combine with the residual air evacuated into the atmosphere. If pollution cannot be reduced by process modification, several methods are available to ensure that the pollutants do not enter the air. These methods include filters, which neutralize pollutants by physical phenomena such as dissolution and adsorption or by chemical reactions, for the separation of dusts, liquid globules, and gas; and other kinds of apparatus, such as scrubbers, which purify gas by dissolving it in water diluted with a reactive or neutralize it with a reactive solution. The characteristics, operating conditions, and efficiencies of each type of equipment are reviewed. From the point of view of efficiency, ease of use, and cost of exploitation, the equipments discussed represent high degrees of perfection.

3746 APTIC NUMBER 13331

Lee, G., N. J. Themelis, and W. H. Gauvin
CHEMICAL RECOVERY FROM SODIUM-BASE SPENT SULPHITE LIQUORS BY THE ATOMIZED SUSPENSION TECHNIQUE. Tappi, 41(6):312-317, June 1958. 18 refs. (Presented at the Summer Meeting, Tech. Sect. of the Canadian Pulp and Paper Assoc., Saranac Lake, N. Y., June 1957).

The treatment of preconcentrated acid sodium sulfite spent liquors was studied in the Pulp and Paper Research Institute of Canada's 8 in. atomized suspension reactor. Wall temperatures of 650-800 C and residence times of 14 to 22 sec were used to investigate the effects of the liquors on the nature and composition of the resulting products. Sodium salt was recovered in the very form required for sulfiting, namely as sodium carbonate. Unlike other proposed procedures, the atomized suspension technique produced few traces of sodium sulfide and thiosulfate and only small amounts of sodium sulfate. The combustible gas produced during pyrolysis possessed good calorific value, and was available in sufficient quantity to make the process thermally self-sufficient. As much as 80% of the sulfur originally present in the spent liquor was recovered in the gas. In addition to its excellent chemical recovery, the process operates as a completely closed system, eliminating the pollution potential of the treated liquor and permitting total recycling of the process water. Translation of these results to a recovery plant for a sodium-base pulp mill is outlined and a crude, preliminary economic evaluation is given. Optimum operating conditions must be determined and additional engineering obtained before a commercial installation is attempted. (Author conclusions modified)

3747 APTIC NUMBER 13667

Lehle, W. W.
PROCESSING OF WASTE GASES FROM SULFURIC ACID PLANTS. In: The Manufacture of Sulfuric Acid, Werner W. Duecker and James R. West (eds.), Am. Chem. Soc. Monograph Series, New York, Reinhold Publishing Corp., 1959, Chapt. 20, p. 346-358. 25 refs.

Tail gases from contact sulfuric acid plants consist mainly of nitrogen, oxygen, carbon dioxide, and a small amount of sulfur dioxide. Though present normally in small concentrations, sulfur dioxide, sulfur trioxide, and sulfuric acid can exceed permissible limits during start-ups and plant upset conditions. Sulfur trioxide and sulfuric acid vapor both form sulfuric acid mists which produce visible plumes from acid plant stacks. Processes for treating tail gases of sulfuric acid plants include scrubbing sulfur dioxide from waste with water, soda ash solutions, lime slurries, salt solutions, and ammonia solutions; the ezorption process developed by the Consolidated Mining and Smelting Company; and the Katasulf modified autoclave process. As illustrated by the Cominco sulfur dioxide recovery system, an automated two-stage scrubber method using ammonia solutions has a number of advantages. It will reduce sulfur dioxide concentrations in tail gases to 0.03, handle gas concentrations as high as 0.9% sulfur dioxide, produce a scrubber liquid which has commercial value, and, by eliminating pollution, allow a plant to operate at an overload capacity on the order of 20%. Pease-Anthony Venturi scrubbers and Calder-Fox scrubbers are not efficient for sulfuric acid mists less than 10 microns. Of the equipment available for mist removal, wire-mesh eliminators and ceramic filters are more effective than cyclone separators, baffles, Vane-type separators, and packed-bed separators. The costs of wire-mesh removals is modest, though the possibilities of corrosion must be considered in selecting the mesh-wire material. The ceramic filter tube requires considerably more filtering area.

3748 APTIC NUMBER 13011

Leitner, Murray I.
AN ANALYTICAL APPROACH TO THE DETERMINATION OF PARTICLE TRAJECTORIES IN A S-BEND DUCT WITH EXPERIMENTAL VERIFICATION. J. Amer. Helicopter Sci., 13(4):48-55, Oct. 1968. 12 refs.

A two-phase program was undertaken to determine if the inertial characteristics of the flow in an S-bend duct could be utilized to separate dust particles and minimize engine dust ingestion. The first phase covers the analytical efforts required to determine the theoretical trajectories for particles of various sizes and densities within the potential flow field of the inlet. An electric analog was used to determine the external and internal potential flow fields for various inlet velocities and S-bend configurations. The basic equations of motion were then utilized to calculate the theoretical trajectories. The analytical portion progressed from a purely internal flow calculation to a complete external and internal trajectory for one half of a bifurcated inlet with an S-bend within the duct and incorporating a secondary flow system for removing dust particles. This latter system was considered as a candidate for incorporation into the induction system of the Advanced Aerial Fire Support System (AAFSS). The experimental phase utilized a two-dimensional section through the proposed AAFSS duct. High speed motion pictures (1,000 frames per second) indicated that the calculated trajectories are closely duplicated by the experiments in the external field and the initial portion of the bend. Flow separation along the inner wall at the point of maximum curvature distorted the flow field with attendant deviation of the particle trajectories. The analysis appears to be a useful tool in calculating particle trajectories. It is also concluded that an S-bend with secondary flow could be developed to provide adequate engine inlet protection against sand and dust ingestion. (Author summary)

3749 APTIC NUMBER 12950

Lenke, Kurt, Karl-Heinz Kubitza, and Wilhelm Finze
PROCESSES FOR DECREASING THE SULFUR CONTENT OF COAL. (Aufbereitungstechnische Moglichkeiten zum Senken des Schwefelgehaltes von Kohle). Text in German. Gluckauf (Essen), 105(4):141-147, Feb. 20, 1969.

Since nothing was known in Germany about the efficiency of the two almost exclusively used processes for sorting and separating pyrite from coal, namely laundering and flotation, experiments were conducted. They were later also expanded to other separating processes less frequently used. Of the wet processes, laundering was found to separate pyrite satisfactorily from material with lumps larger than 1 mm; with finer grains, it becomes less efficient. Laboratory tests of the flotation process showed that the pyrite content in the concentrate strongly depends on the solids content, and above a threshold of 530 g/ton on the amount of reagent as well. Experiments in decreasing the pyrite content of the coal by raising the pH value were successful only at pH 11. With a pyrite sluice, good results were achieved. With a wet operating vibrating hearth, the sulfur content could be reduced from 1.65% to 1.32% at a carbon loss of only 1.3%. Of the other tested methods for separating pyrite, the Lavodune and Lavoflux brought no satisfactory results. Wet processes are superior to dry processes as far as separation efficiency is concerned. Dry methods are used in Germany only because almost 40% of the material suitable for pyrite separation accumulates in the dry state. Moreover, no dehydration problems are to be faced. Sifters brought no satisfactory pyrite separation. Efforts by the Technical University of Berlin to use electrostatic and magnetic separators have not yet brought any results. The roller magnet seems to be most promising. It operates with a field strength of 18,000 G. With this method the sulfur content of the grain class 1 to 0.1 mm could be reduced from 2.8 to 1.6%. The carbon loss, however, was 14.9%.

3750 APTIC NUMBER 13051

Leonard, Joseph W. and Edwin B. Wilson
COAL PREPARATION. Mining engineering, 21(2):107-108, Feb. 1969.

Much of the coal preparation research currently in progress

originated from a comprehensive program developed by the National Center for Air Pollution Control for reducing sulfur content of coal. The research programs began with desulfurization of coals for removal of pyrite by specific gravity and magnetic separations. Attempts were aimed at obtaining a high-pyritic refuse as a feedstock to a sulfuric acid plant. Research is currently centered around a laboratory-sized model of a commercial, induced roll, magnetic separator which is capable of creating a magnetic field of 23,000 gauss. Research on coal preparation in relation to reduction of boiler tube corrosion is being carried out with the use of limestone additives, crushing, sizing, and coal cleaning. Treatment of coal refuse slurries with synthetic organic flocculants and the effects of low temperature on chemical and physical properties of coal are also areas of research. Drying of coal by acoustic energy and cleaning of coal by electrostatic separation are being studied. The U.S. Bureau of Mines has recently developed a videline nuclear magnetic resonance device for measuring S-33 isotopes, which enables total sulfur content to be calculated.

3751 APTIC NUMBER 13665

Lepsoe, R. and W. S. Kirkpatrick
SULPHUR DIOXIDE RECOVERY AT TRAIL. A GENERAL PICTURE OF THE DEVELOPMENT AND INSTALLATION OF THE SULPHUR DIOXIDE PLANTS OF THE CONSOLIDATED MINING AND SMELTING COMPANY OF CANADA, LIMITED, AT TRAIL, B. C. Trans. Can. Inst. Mining Met., vol. 40:399-404, 1937.

The reduction of sulfur dioxide to elemental sulfur at a plant manufacturing phosphate and nitrogen fertilizers is described. Of the sulfur dioxide present in the zinc roaster gas used at the plant, about 60% is fixed directly as acid. The remainder is absorbed, and the sulfur dioxide is liberated and used for either acid or elemental sulfur product. Ammonia is the base of the absorption process, which is similar to the method of sulfur dioxide fixation used in the paper industry to produce calcium bisulfite. After preliminary cooling in waste-heat boilers and partial cleaning by a Cottrell treater, roaster gas is further cooled in one or more absorbing towers where aqueous ammonia is introduced. Here, sulfur dioxide is fixed by the ammonium ions to form ammonium sulfite, which changes to ammonium bisulfite as the passing of sulfur dioxide continues. In a subsequent 'acidification' process, ammonium bisulfite is reacted with sulfuric acid to produce ammonium sulfate and 100% SO2 gas, the last of which is dried with sulfuric acid and then blown to a reduction furnace. The first phase of reduction occurs when the gas is passed through incandescent coke in the presence of oxygen. Here side reactions take place, producing carbon monoxide and carbon oxysulfide. Under proper conditions, carbon oxysulfide and sulfur dioxide react to produce carbon dioxide and elemental sulfur. In the process described, this reaction takes place in brick-lined catalyst columns, from which the gases pass through waste-heat boilers, where the gaseous sulfur is condensed in the form of mist and liquid. Sulfur of 99.95% purity is obtained.

3752 APTIC NUMBER 12803

Liesegang, Dietrich
THE EFFECT OF GAS TEMPERATURE UPON THE PERFORMANCE AND DESIGN OF ELECTROSTATIC PRECIPITATORS. Staub (English Translation), 28(10):16-19, Oct. 1968.
CFSTI TT 68-50448/10

The relationship between electric resistance and gas temperature, and its effects on separation efficiency of electroprecipitators is reported. This is followed by considerations on the influence of gas heat on discharge electrodes and collecting electrodes, on rapping devices and insulators. Finally, information is given with regard to a suitable arrangement of filter installations to avoid minimum performance of an electroprecipitator depending on temperature. (Author Summary Modified)

3753 APTIC NUMBER 13630

Lowicki, Norbert
THE NEW WASTE GAS DESULFURIZATION METHOD OF THE GRILLO WERKE AG. (Das neue Abgas-Entschwefelungverfahren der Grillo-Werke AG.) Text in German. Erzbergbau Metallhuettenwesen, 21(12):567-571, Dec. 1968.

There are three methods for desulfurizing waste gases; first by oxidation of SO2 to SO3 on vanadium catalysts, secondly by adsorption of gaseous sulfur compounds on activated coal or coke, and thirdly by absorption, i.e., chemical binding of acid components in the waste gas by alkaline substances. Detailed discussion of the latter method shows that in all cases where this principle has been put into practical use, costs ran tremendously high, primarily because of the complicated regeneration and recovery operations for the absorbent and the sulfur bound by it. The Grillo Werke AG, in developing its absorption method, tried to make it as economical as possible, and although the present method is not the definitive solution, it does provide some advantages over other methods. The Grillo method is based on the principle of formation of oxide compounds between an alkaline and an amphoteric heavy metal component. Thus, the two components mutually prevent each other from being inactivated by the temperatures necessary for thermal regeneration. In this way, both sulfur dioxide and hydrogen sulfide can be bound. Manganese and magnesium are used as elements for the formation of oxide compounds. Experiments in a large-scale plant showed that between 80 and 95% of the SO2 of a waste gas could be removed. Interestingly, the degree of loading of the absorbent suspension played a secondary role. The absorbent which is tapped off in dry state contained between 17 and 21% sulfur, which justifies recovery operations. Any sulfuric acid factory in the vicinity can be used for this purpose. A detailed description of the experiments is given, as well as an example of practical application of the Grillo absorption method.

3754 APTIC NUMBER 13521

Ludwig, Steven
ANTIPOLLUTION PROCESS USES ABSORBENT TO REMOVE SO2 FROM FLUE GASES. Chem. Eng., 75(3):70-72, Jan. 29, 1968.

Mitsubishi Heavy Industries, Ltd. has started operation of a chemical absorbent SO2 removal system on a semi-commercial basis. The unit processes 25% of the flue gas output of a 220 Mw, oil burning power plant. The flue gas at 212 to 356 F enters an absorption tower where active manganese oxide in powder form is uniformly dispersed into it to a concentration of 150 to 250 g/cu m. Manganese sulfate is formed by the reaction of SO2 and SO3 with the manganese oxide. The exit gas stream is fed to a cyclone where about 90% of the unreacted absorbent and manganese sulfate are collected and returned for recirculation to the gas stream entering the absorption tower. The residual 10% is collected in an electrostatic precipitator and then directed to a tank where H2O is added to form a slurry. The slurry is passed through an ammonium recovery tower, then sent to a regenerator where oxidation at room temperature is accomplished by injecting air and ammonia into the unit. Active manganese oxide is regenerated and an ammonium sulfate solution is obtained. The oxide is separated from the solution by filtration and returned to the flue gas inlet. The remaining solution goes to a crystallizer for recovery of high-quality ammonium sulfate crystals. Removal rates as high as 98% have been effected with an input gas containing 0.1% SO2.

3755 APTIC NUMBER 12661

D. L. Mains
CLEARING THE AIR AT CANTON MALLEABLE. Foundry, 96(12):94-95, Dec. 1968.

A new, self-contained molding and pouring facility at Canton Malleable Iron Co. features an extensive dust and fume control system as well as modern molding and handling equipment. The system was designed to cope with the special problems of an automatic molding, mold conveying, and continuous sand preparation installation. It has resulted in improved working conditions and community relations as well as some sand recovery. The system is described briefly.##

3756 APTIC NUMBER 13205

Markvart, Miroslav and Vladimir Pour
SELECTIVE REDUCTION OF NITROGEN OXIDES WITH AMMONIA. (Selektivni redukce kyslicniku dusiku amoniakem). Text in Czech. Chem. Prumysl (Prague), 19(1):8-12, 1969. 12 refs.

In manufacturing nitrogen acids, catalytic reduction of nitrogen oxides in fall gases is the most effective method of neutralization. Using ammonia as a catalyst, nitrogen oxides can be selectively eliminated. The consumption of fuel using ammonia is approximately ten times lower than with other reducers. Tests were conducted to gain more information about the method. All measurements were taken under atmospheric pressure, and the reaction took place in the kinetic range. Nitrogen oxides were detected by the standard titrimetric method. Catalyzers were prepared by depositing active metal on aluminium. In the absence of oxygen, the reduction is fastest on platinum catalyzers; 95% conversion is reached with temperatures above C. In the presence of oxygen on the same catalyzer, the temperature may be as low as 180 C. The increase in speed of reaction is most evident with small concentrations. The activity of the catalyzer is greatest when the amount of Pt is 1%. In all of the tests, the greater the speed of the gases, the higher the temperature must be. The only disadvantage of this method is that ammonia salts are generated that may deposit on the cool parts of the reactor.

3757 APTIC NUMBER 12981

Mastin, T. W. and T. J. Sheahan
CLEANER AIR AND THE MOTOR VEHICLE. (Seijo na kuki to jidosha). Text in Japanese. Sekiyu Gakkai Shi (J. Japan Petroleum Inst., Tokyo), 12(4):286-292, April 1969. 15 refs.

In a 1966 report by HEW automobiles were shown to cause 60.6% of the total air pollution. Other sources were industries, thermal power stations, heaters, and burner ducts. Pollutants totalled 142,000,000 tons per year. Without emission controls, the typical automobile discharges 567g hydrocarbons per day. Regulations enacted by the Federal government at the beginning of 1968 require the installation of crank case emission controls on all new cars. Final control regulations for automobiles were decided in June 1968, but those for gasoline engines were postponed to 1970. Others will not go into effect before 1972 or 1971. Cleaner air systems were authorized for Chryslers in 1964. Min-Air-Ox, Thermactor, and Air Guard are the most up-to-date control systems for gasoline engines. For diesel engines, a premium diesel fuel containing a black smoke-suppressing ingredient is very effective. A typical research program is the Inter-Industry Emission Control's program. Control research is also being carried out by HEW, the American Automotive Manufacturers Assoc., and A.P.I. All groups advocate the Positive Crankcase Ventilation system which recycles exhaust air through an air cleaner. Models for 1968 have air fuel ratio controls requiring cleaner carburetors. Gasoline additives that function also as carburetor cleaning agents have appeared in the commercial field.

3758 APTIC NUMBER 12998

EXHAUST PURIFIERS CLEAN THE AIR. Mater. Handling Eng., 24(8): 108-110, Aug. 1969.

Air inside Armstrong Rubber Company's West Haven, Conn. warehouse is kept clean by using a combination of exhaust blowers and LP gas lift trucks fitted with catalytic mufflers. Three blowers on each of the three storage floors are used to change interior air in the 600,000 sq ft building. The LP gas-fueled lift trucks are fitted with PTX purifiers. Platinum on a special ceramic support catalyzes the oxidation of the CO, hydrocarbons, and exhaust odors into CO2 and H2O vapor. The catalyst lasts thousands of hours without requiring replacement. The purifiers replace the conventional mufflers and work well with LP gas, white gasoline, or diesel fuel. They warm up in 30 to 45 sec. Zenith Corp. has equipped its seven tractors and 42 lift trucks with Oxy-Catalyst catalytic mufflers. These vehicles

are fueled with 87 octane naptha gasoline. Exhaust gases are oxidized into CO2 and H2O as they pass through a bed of catalyst-coated pellets in the purifier. The mufflers require maintenance after 500 to 600 hrs of use. A 90 psi air stream is used to blow off carbon deposits and more pellets are added. After 2000 hrs of operation, the entire catalytic bed is replaced.

3759 APTIC NUMBER 12966

Matsumoto, Keishin and Yasuhiro Takemura
INTRODUCTION TO THE TECHNICS OF HYDRODESULFURIZATION OF HEAVY OIL. (Juyu no datsuryu gizutsu). Text in Japanese. Nenryo Kyokai shi (J. Fuel Soc. Japan), 48(3):160-170, 1969. 24 refs.

Processes employed in the hydrodesulfurization of heavy oil are discussed. Both direct and indirect methods, and a combination of the two are reviewed. The indirect method is recommended as the best. Kinetics and equilibria of the processes are discussed. Equilibrium constants for 40 S complexes are tabulated and an equation for whole reaction rate is given. The diffusion process is shown to be effective through kinetic and equilibrium considerations. The relationship between catalyst structure and activity is described. Cobalt-Mo, Ni-Mo, and Ni-Mo-Co systems with Al2O3 as a 'builder' are explained. Various hydrodesulfurization processes used by industry and the characteristics of the raw materials used are tabulated.

3760 APTIC NUMBER 13217

Mattia, Manlio M.
PROCESS FOR REMOVING ORGANIC CONTAMINANTS FROM AIR. (Day & Zimmermann, Inc., Philadelphia) U. S. Pat. 3,455,089. 4p., July 15, 1969. 3 refs. (Appl. Nov. 27, 1967, 4 claims).

A process is presented for removing organic contaminants from air by adsorption. This is accomplished in a continuous process by using several parallel adsorbers, with one or more of the units being regenerated while one or more remain on stream. Contaminants driven from the adsorbers during regeneration are used as fuel for heating the regenerating gases. Adsorbent beds, such as activated charcoal, that normally are adversely affected by the very high temperatures associated with direct burning can be used in the system. Combustion products are preferably recycled through the adsorber so that only treated exhaust leaves the system.

3761 APTIC NUMBER 13119

Mattox, William Judson and Glen Porter Maesner
DESULFURIZATION PROCESS FOR HEAVY PETROLEUM FRACTIONS. (Esso Research and Engineering Co., Inc.) U. S. Pat. 3,449,242. 10p., June 10, 1969. 2 refs. (Appl. March 15, 1966, 5 claims).

A process of desulfurizing a petroleum hydrocarbon fraction which contains sulfur in the form of sulfides, disulfides and thiophenes is described. The hydrocarbon fraction is contacted with a molten potassium hydroxide reagent containing 5 to 30% water. The sulfur content of the oil fed to this first stage is reduced from 30 to 60 wt %. The reaction products are withdrawn and contacted with a suitable solvent in a separation zone. The products are separated into two phases: an upper phase containing the partially desulfurized oil, and a lower phase containing an aqueous solution of the alkali metal reagent and some of the sulfur contaminants from the oil. The partially desulfurized oil is sent to a second stage where the procedure is the same as that of the first stage. The aqueous phase is passed to an alkali metal regeneration system. The reaction products from the second stage are withdrawn and passed to a separation zone where the desulfurized oil is recovered, and the partially spent potassium hydroxide is sent to the regeneration system.

3762 APTIC NUMBER [illegible]32

McHattie, Robert Howard and Peter Douglas Greening
INTERNAL COMBUSTION ENGINE AIR FILTERS. (General Motors Corp, Detroit, Mich.) U.S. Pat. 3,450,117. 3p., June 17, 1969. 4 refs. (Appl. Nov. 28, 1967. 4 claims).

In order to reduce hydrocarbon emission from internal combustion engines, it is common to recycle blowby gases from the crankcase through the air filter to be reburnt in the engine. Problems arise when the blowby fumes condense on the filter element and collect to restrict the intake of air into the engine. A device to eliminate this problem is described. The device consists of an air filter with a condensing chamber in front of the filter element. The blowby gases are cycled through the condensing chamber where any crankcase vaporized oils are condensed and returned to the crankcase. The cleaned blowby fumes then pass through the air filter along with the normal air intake and no clogging of the filter occurs.

3763 APTIC NUMBER 13784

Messen-Jaschin, Gregori
APPARATUS FOR PURIFYING AIR. (G. A. Messen-Jaschin, Sarnen, Switzerland) U. S. Pat. 3,438,267. 7p., March 25, 1969. 20 refs. (Appl. Sept. 1, 1965, 9 claims).

An installation for purifying street air from automotive exhaust gases is described. A number of electrofilters are located in two rows on opposite sides of the street below the street level. Ventilators suck in the air to be purified from the streets and pass it through the electrofilters. After the air passes through the filter, it is guided through a combustion chamber where carbon monoxide is converted to carbonic acid. The apparatus has a separate air-withdrawing channel connected to each combustion chamber which opens into the side wall of a discharge gutter.

3764 APTIC NUMBER 13783

Miller, E. B.
ADSORPTION BY SILICA GEL. II. Chem. Met. Eng., 23(25):1219-

1222, Dec. 22, 1920. (Presented before the Am. Inst. Chem. Eng., Montreal, June 28, 1920).

The most satisfactory method for recovering solvent vapors after they have been adsorbed by silica gel, consists of heating the gel and sending steam directly through it. For volatile solvents such as ethyl ether, acetone, benzene, and gasoline, 150 C is considered the optimum temperature to bring about rapid distillation of the vapors from the gel. It was found that using a 1% mixture of ether vapor and air, silica gel adsorbs an amount of ether corresponding to 14.4% of its own weight; and, using a 3.08% mixture, it adsorbs 15.5% of its own weight. In each case it adsorbed at 8% of its weight at 100% efficiency. The results of experiments conducted on the adsorption efficiency for acetone, benzene, and petroleum ether are presented graphically.

3765 APTIC NUMBER 13580

Miller, F. G.
REDUCTION OF SULFUR IN MINUS 28 MESH BITUMINOUS COAL. Trans. AIME (Am. Inst. Mining Metallurgical and Petroleum Engrs.), 229(1):7-15, March 1964. 11 refs.

Pyritic sulfur can be present in all gravity fractions of coal, but it occurs in increasing quantities in the high gravity fractions. Organic sulfur decreases as the gravity increases in proportion to the amount of carbon-containing material removed as float. Sulfur removal by froth floatation can be accomplished only byremoval of pyritic sulfur. When recovery is maximum, the floatation tailings contain only pyritic sulfur. In a rougher float test, floatation should be stopped at some yield point below that at which the tailings sulfur becomes 100% pyritic. This will decrease the chances of floating high gravity materials in all stages, and result in a cleaner product. Three stage floatation was found to be the best for sulfur removal. Because hydrocyclones separate primarily by specific gravity, they are an effective means of removing pyritic sulfur. They are best used in combination with froth floatation if high yields are to be obtained because they tend to throw extreme fines of all gravities to their clean product.

3766 APTIC NUMBER 13026

Minoura, J.
ON THE NOVEL METHOD OF COPPER REFINING WITH THE AIM OF PREVENTION OF POLLUTION BY MINERALS. (Kogai-boshi o mokuteki toshita atarashii do-seiren-ho ni tsuite). Text in Japanese. Netsu Kanri (Heat Engineering, Tokyo), 21(5):12-16, May 1969.

A novel copper refining method, using 'The Auto-blast furnace' developed in Finland, is becoming predominant in Japan. It has three notable advantages: (1) easy re-absorption of SO2 by means of compressed flue gas; (2) low cost, because of less investment for the facilities and equipment for pollution prevention; and (3) production of more by-product H2SO4. The refining process can be briefly summarized as follows: (1) preliminary process, in which the minerals are dried; (2) melting and refining; and (3) handling of flue gas. A significant aspect of this method is that controlling the temperature and pressure within the furnace and cyclone enables almost perfect re-absorption of SO2 emitted and production of a considerable amount of H2SO4.

3767 APTIC NUMBER 13637

Mitsubishi Jukogyo Kabushiki Kaisha, Tokyo, Japan
PROCESS FOR THE TREATMENT OF SULFUR OXIDE-CONTAINING GASES. Brit. Pat. 1,078,596. 8p., Aug. 9, 1967. (Appl. March 7, 1966, 16 claims.)

A dry contact absorption process for removing sulfur oxides using solid particulate hydrated manganese oxide eliminates the cost and efficiency disadvantages of the more common dry adsorption and absorption systems. Solid manganese sulfate formed during the contacting is dissolved in H2O or aqueous ammonium sulfate solution. The resulting solution is mixed with ammonia and oxidized with O2 or a free O2-containing gas to form a hydrated manganese oxide. The ammonium sulfate obtained is of a high purity and can be recovered in commercial quantities. The absorbent can be regenerated and cycled through the system.

3768 APTIC NUMBER 13903

Miyake, Yoshizo
DEVELOPMENT OF ELECTRIC VEHICLES IN JAPAN. Preprint, Society of Automotive Engineers Inc., New York, 15p., 1969. (Presented at the International Automotive Engineering Congress, Detroit, Mich., Jan. 13-17, 1969, Paper 690072.)

A comprehensive review is given of electric vehicles developed in Japan since 1966. Descriptions and specifications of various models are given. Commercial, as well as academic and government research projects, are listed. All prototypes of electric vehicles up to the present have been modified versions of the gasoline automobile, most of them with conventional storage batteries such as lead-acid and nickel-cadmium alkaline batteries as power sources. Motors used on these prototypes are of the d-c series type, with a few exceptions employing those of d-c compound type. Control systems are of the thyristor (SCR) chopper type, with a few exceptions employing regenerative braking systems. Practical applications of the electric vehicle are demonstrated in their use as traveling utilities and delivery vans within city areas with the conventional storage battery as the power source. For significant improvement in the performance of the electric vehicle, research is being conducted on the development of new types of batteries and on smaller, lighter motors and controllers.

3769 APTIC NUMBER 13460

Mond, Albert
METHOD OF AND APPARATUS FOR SEPARATING GASES AND THE FORMATION OF

PRODUCTS THEREBY. (Hubers & Mond, London, England) Brit. Pat. 112,153. 7p., Dec. 21, 1917. (Appl. Dec. 21, 1916, 7 claims.)

A method is presented for separating a constituent, chlorine in particular, from a mixture of gases by absorption and precipitation. In applying this method to the removal of free chlorine from a mixture of gases, the absorbing agent, calcium hydroxide, is distributed through the gas mixture and forms a cloud or mist. The cloud is then precipitated by the action of an electrical field of sufficient strength to precipitate the absorbent material and to cause electrical windage in contact with the deposited material for promoting absorption of the chlorine by the calcium hydroxide.

3770 APTIC NUMBER 12527

Morrison, J. L.
RECOVERY SCRUBBER FOR WASTE CHLORINE GAS. Tappi, 51(12):124A-125A, Dec. 1968. (Presented at the 5th Water and Air Conference of the Technical Association of the Pulp and Paper Industry, Portland, Oregon, April 1-4, 1968.)

Equipment was installed in a kraft mill bleach plant to combine and scrub waste gas discharges containing chlorine. Scrubbing was done with a 4% caustic solution. The scrubber, while improving atmospheric conditions, pays for itself by recovering 96% of the waste chlorine as hypochlorite bleach liquor. (Author's abstract) ##

3771 APTIC NUMBER 12965

Murakami, Machiro
ABOUT MICRO GLAS FILTER BAG. (Maikuro gurasu fuiruta baggu ni tsuite). Text in Japanese. Kuki Seijo (Clean Air-J. Japan Air Cleaning Assoc., Tokyo), 6(2):43-47, June 1968. 4 refs.

The need for dust collection to avoid air pollution is becoming more urgent. The bag filter is preferred for high temperature use from an economic point of view. Fiber glass is the only filter fabric currently in wide use. Dust collection in fiber glass filters is accomplished by a thin layer of trapped dust, the filter material only serving to establish the layer. The pressure drop across a typical filter is equal to the product of the dust load, specific resistance of accumulated dust, viscosity of the gas, and the apparent air velocity divided by an appropriate conversion factor. Preferred filter cleaning methods include reverse air flow, vibration with sound, or a combination of the two. The best filter material available is a non-alkali fiber glass. Treating the material with silicone increases its strength. Results of testing show that such a filter retains 70% of its initial strength after being subjected to 300 C for 360 hrs. Dust collection efficiencies of fiber glass filters are shown graphically. Efficiencies greater than 99.5% can be obtained with filter air velocities less than one m/min. Bags can be used for 14 to 24 months. The filters can operate at temperatures over 200 C and continuous operation is recommended.

3772 APTIC NUMBER 12968

Naumova, L. A.
SANITARY-HYGIENIC EVALUATION OF THE PROCESS OF OBTAINING ALUMINUM-BERYLLIUM ALLOYS. (Sanitarnogigienicheskaya otsenka protsessa polucheniya alyuminievo-berillievoy ligatury). Text in Russian. Gigiena Truda i Prof. Zabolevaniya, no. 6:36-38, 1969.

The health aspects of aluminum-beryllium alloy preparation were studied under both industrial and test conditions. Beryllium content in exhaust air samples was determined by colorimetry with Beryllon P reagent. Beryllium content was greatest during the refining stage, reaching an average of 0.14 mg/cu m. By eliminating this stage (which does not reduce the alloy quality), the average overall beryllium content was reduced from 0.3 to 0.004 mg/cu m. These studies resulted in revision of production instructions to eliminate the refining stage, provide hoods for the melting furnaces, and ventilate work areas with a 1 m/sec air flow rate.

3773 APTIC NUMBER 13055

Wetschert, Bruce C.
AIR POLLUTION AND ELECTRIC POWER. IEEE (Inst. Elec. Electron. Engrs.) Spectrum, 6(7):71-76, July 1969. 10 refs.

The various developments in air pollution abatement regarding economic justifications are discussed. One approach to reducing sulfur oxide pollution has been to set a standard for maximum sulfur content in the fuel that is burned. If the fuel user desires to continue burning the same type of fuel, he can meet this standard in a number of ways: by using a fuel that has a low sulfur content; by desulfurizing the fuel; or by blending high-sulfur fuel with low-sulfur fuel. However, there is a larger supply of coal and oil with high sulfur content than with low sulfur content, and since the price is lower it finds more use. Other methods of abating air pollution are the use of natural gas, which is sulfur-free, the use of nuclear power, the desulfurization of stack gases, and employing a high stack. All of these methods have some shortcomings. The price of natural gas could rise if a great number of industrial plants began to use it in place of fossil fuels. Avoiding air pollution by the use of nuclear power could result in increased thermal pollution of water resources. Although stack gas desulfurization is still in the e experimental stage, it appears to be the most promising method, since large quantities of elemental sulfur and sulfur dioxide can be recovered.

3774 APTIC NUMBER 12983

Nishizawa, Yukinori, Shigeo Oshima, and Tatsuo Maekawa
STUDY ON REMOVAL OF IODINE FROM ATMOSPHERE BY SPRAY. (III). REMOVAL OF ORGANIC IODIDES BY SPRAY. (Kakuno yoki supurei ni yoru yoso suisen koka ni kansuru kenkyu: Yuki yoso kagobutsu no suisen koka). Text in Japanese. Nippon Genshiryoku Gakkaishi (J. At. Energy Soc. Japan), 11(5):262-267, 1969. 6 refs.

The removal of organic iodides containing methyl iodide from the atmosphere by means of spraying was studied. Small-scale steel vessels simulating contamination conditions were used for the experiment. Two experiments were carried out. In one, a steel vessel which contained the iodides was maintained at 25 to 80 C under atmospheric pressure and sprayed with water at the same temperature as the vessel. In the other, a vessel was filled with saturated steam at 100 to 150 C and sprayed with cold water to closely simulate the conditions of actual accidents. The removal rate of the organic iodides was determined by analyzing the concentration of the gas phase by means of gas-liquid chromatography. The washout speed and rate were obtained by a first-order equation in the first experiment. The results of the second experiment were consistent with the curve calculated from the rate constants obtained in the first experiment. The experimental results also indicated that the removal rate of methyl iodide by spray increased in proportion to the spray rate as temperature decreased.

3775 APTIC NUMBER 13170

Nishizawa, Yukinori, Shigeo Oshima, and Tatsuo Maekawa
STUDY ON REMOVAL OF IODINE FROM ATMOSPHERE BY SPRAY. (IV). REMOVAL OF IODINE BY REACTIVE SPRAY. (Kakuno yoki supurei ni yoru yoso suisen koka ni kansuru kenkyu, (IV) hannosei suiyoeki no supurei ni yoru yoso suisen koka). Text in Japanese. Nippon Genshiryoku Gakkaishi (J. At. Energy Soc. Japan), 11(6):10-16, 1969. 8 refs.

The washout removal of iodine from the atmosphere by reactive spray was studied with small steel vessels used to simulate containment. Experiments conducted at 25 to 80 C were performed under normal steady-state spray conditions; runs at 100 to 150 C utilized spray accompanied by cooling, the steam pressure being in equilibrium with the temperature of the experiment. The iodine removal rate was evaluated by varying the gas phase concentration, which was determined by thiosulfate titration. Results show that the washout rates of iodine by a spray of 0.1 to 1N NaOH solution were 30 to 70 times faster than by untreated city water, and that the rates were independent of temperature. A similar degree of enhancement was observed with sodium thiosulfate solution. An even greater effect was obtained with sodium sulfite solution. The rate of iodine washout was a first order reaction, which suggests that gas film controlled absorption is the mechanism of iodine absorption in liquid drops. (Author abstract modified)

3776 APTIC NUMBER 13008

O'Reilly, Bernard
PROCESSES OF REMOVING PLASTIC INSULATION FROM WIRES AND OF CONTROLLING GASES RESULTING THEREFROM. (Nassau Smelting and Refining Co., Inc. Tottenville, N. Y.) U.S. Pat. 3,448,509. 3p., June 10, 1969. 3 refs. (Appl. Feb. 5, 1964, 13 claims).

The gases evolved through distillation of certain plastic insulation from conductor wires contain acid and other pollutants which must be reduced before the gases can be released to the atmosphere. A process is described to accomplish the necessary reduction of the pollutants. The insulated wire is first heated in an air-sealed chamber having a gas outlet until the plastic is reduced to a crisp residue and the resulting gases are distilled from the plastic. The gases are then scrubbed with water after leaving the outlet until the pollutants in the gases are returned to tolerable levels.

3777 APTIC NUMBER 13697

Obering, E. Albrecht
SLUDGE INCINERATION IN THE FLUIDIZED BED FURNACE. (Schlammverbrennung im Wirbelschichtofen). Text in German. Chem. Ing. Tech., 41(10):615-619, 1969. 2 refs.

Sewage sludge disposal becomes an ever greater problem since dump sites are becoming scarce and awareness of the danger of uncontrolled dumping is spreading. Disposal by incineration decreases the volume and leaves sterile ash and inert odorless gases. Sludge incineration must be preceded by mechanical dehydration to avoid emission of volatile organic sludge components with the waste gas and to permit autonomous combustion. To achieve the latter goal, the combustion temperature must be high, the excess air in the reaction chamber low, the incineration complete, and the temperatures of the waste gases and vapors low. However, the waste gas temperature may not drop below 750 C if odors are to be avoided and if the residues ought to be sterile. To solve the problem, the fluidized bed furnace must be used. The sludge falls into a bed of turbulent sand particles where it is dried, degassed, and ignited. The temperature of the waste gas at the combustion chamber outlet is 800 to 900 C. It is cooled in an air preheater and the heat is returned to the combustion chamber. In the subsequent dust collector, the mineral sludge components are separated as dust either by a wet or dry process and tapped off to an ash pit. The turbulent sand particles are slowly eroded and carried off with the ash. They are replaced by larger ash particles and by sand brought in by the sewage sludge. The furnace has no movable parts aside from the charging facility and the ventilators so that wear and tear are low. The city of Lausanne has operated such a fluidized bed furnace since 1965. The furnace burns 2600 kg of dehydrated sludge per hour (max. water content 60%). Part of the waste gas is used to heat the combustion air and the rest goes to a boiler. The waste gases are cleaned in cyclone separators and electrostatic precipitators.

3778 APTIC NUMBER 13179

Ochs, Hans-Joachim
AIR POLLUTION CONTROL WITH ACTIVATED COAL. (Luftreinigung mit Aktivkohle). Text in German. Wasser Luft Betrieb, 13(1):22-25, Jan. 1969.

Gaseous pollutants can be removed from waste gases by adsorbents such as activated coal. As raw material for the preparation of activated coal, organic, carbon-containing materials (animal blood, coconut shells, peat, sugar, and certain kinds of wood)

can be used. To activate the material, it is generally coked at certain temperatures and in a neutral atmosphere. This process is followed by oxidation to remove non-coking material. The entire activating process aims at attainment of a large active surface. The total inner active surface may be computed from the amount of gas adsorbed. Nitrogen is frequently used as a test gas, since activated coal adsorbs molecules larger than those of nitrogen only to a limited extent. Apart from the inner surface, the pore structure affects the adsorption efficiency. To achieve optimum efficiency, the pore diameter should be about 20 Angstroms. For gas adsorption, the activated coal usually consists of grains ranging from 1 to 5 mm in size. Efficiency of the activated coal also depends on the critical temperature and the boiling point of the adsorbed substance. Gases with boiling points above 0 C are well suited for treatment by adsorption. The feasibility of adsorption of mists and vaporous substances on activated coal is determined by the molecular weight of the pollutants. For an efficient adsorption, the life expectancy of the adsorbent must be known (as determined from the retention times for various gases).

APTIC NUMBER 13357

3779

Ochs, Hans-Joachim
PROBLEMS OF DUST COLLECTION IN BLAST FURNACE STEEL PLANTS. (Entstaubungsprobleme in Blas-Stahlwerken). Text in German. Wasser Luft Betrieb, 12(9):531-535, Sept. 1968.

The difficult problem of cleaning the brown smoke from blast furnace steel plants can now be considered solved. Through many years of development, dust collectors have been developed which clean the waste gas so that the legally set maximum emission concentration of 150 mg/cu m is not exceeded. Since most dust collectors require previous cooling of the waste gases, it is economical to utilize the liberated heat in a boiler. There are three types of dust collectors available to clean brown smoke, namely electrostatic precipitators, mechanically operating wet collectors and a combination of the first two collection systems. Electrostatic precipitators are well suited for separating the fine suspended particles in brown smoke. Under favorable conditions, they may reach a collection efficiency of 99%. The retained dust can be removed either by dry or wet methods. With dry electrostatic precipitators, efficient dust separation is still possible at gas input temperatures of about 450 C. Pressure loss of the precipitator is generally low and not more than 10 kg force/sq m. The energy requirement depends on the required collection efficiency, as well as on the sizes of the dust particles. At larger plants, it amounts to about 0.06 to 0.35 kW/1000 cu m waste gas. Wet mechanical collectors are less expensive than electrostatic precipitators, and their construction is rather simple, although the energy requirement is high if a high collection efficiency for fine particles is to be achieved. Auxiliary facilities to clean the waste water are required with this method. The most widely used wet collector is the Pease-Anthony Venturi scrubber.

APTIC NUMBER 13095

3780

Ohno, Ietatsu
APPARATUS FOR CLEANING THE EXHAUST GAS OF AN ENGINE. (Assignee not given.) U. S. Pat. 3,446,011. 3p., May 27, 1969. 4 refs. (Appl. May 22, 1967, 6 claims).

Blowby gases from the crankcase of an internal combustion engine contain unburned hydrocarbons, carbon monoxide, and carbon dioxide. The fumes are normally recycled to the carburetor for further burning, but this process often results in spoilage of the carburetor, ignition plug, and the cylinder. To prevent this damage, an apparatus for cleaning the blowby gases without requiring electric power is presented. The apparatus consists of a chamber having a plurality of fins directly connected to an exhaust port of the engine. The unburned components are completely burned within the apparatus directly utilizing the heat of the exhaust gases. The need to recycle the blowby fumes to the carburetor is eliminated.

APTIC NUMBER 13862

3781

Ohtsuka, Tadao, Yoshikazu Hasegawa, and Noboru Takanari
HYDRODESULFURIZATION OF KHAFJI CRUDE OIL. PART 2. COMPARISON OF CONVENTIONAL MOLYBDATE CATALYSTS. Bull. Japan Petrol. Inst., vol. 10:14-19, May 1968. 1 ref.

The properties and activities of three conventional cobalt-molybdate catalysts of varying bulk density were investigated and compared. Experiments were carried out by desulfurizing Khafji crude oil in a flow reactor at 40 kg/sq cm pressure. Reaction temperatures were 390, 410, and 430 C. Catalyst G had a high bulk density; catalyst M a medium density; and catalyst F a low density. Among the three catalysts, the highest sulfur removal was obtained with catalyst F. Hydrogen consumption increased in proportion to the increase in sulfur removal. Large differences in hydrogen consumption were not observed with the catalysts studied, but F catalyst gave a somewhat higher hydrogen consumption than the others. With increasing sulfur removal, the yield of methane increased with all the catalysts studied. At the same level of sulfur removal, M catalyst gave a yield of methane somewhat higher than the other catalysts. Asphaltene in the oil decreased with a reduction in the sulfur content. At the same level of sulfur removal, F catalyst showed a higher asphaltene removal. Catalysts M and G resulted in nearly equal contents of vanadium in the oil, while F catalyst yielded less. The ability of catalyst G to remove sulfur was increased when the particle of catalyst pellets was divided into small pieces.

APTIC NUMBER 12642

3782

Anon.
EMISSION ATTACK SHOWS FIRST RESULTS. Oil Gas J., 66(48):69, Nov. 25, 1968.

A "concept car" which "will virtually eliminate emissions as a problem" was displayed at the API meeting in Chicago to demonstrate the progress of the research project of the Inter-Industry Emission Control group (IIEC). Using a dual

catalyst system and a substantially modified gasoline, the car would reduce emissions to well below current government standards at practical costs. Other aspects of the research being conducted by the 11-company IIEC group are described briefly.##

3783 APTIC NUMBER 13646

Okoshi, O.
ON THE DUST COLLECTOR OF CLOTH-BACK-FILTER IN THERMAL POWER-STATION. (Natsudensho ni okeru Back-Filter shujin sochi ni tsuite). Text in Japanese. Netsu Kanri (Heat Engineering, Tokyo), 21(5):22-25, May 1969.

At the Tokiwa thermal power station, the fabric filter used to collect dust during the coal combustion process was changed from the MC-EP to the EP-MC model. The result is less air pollution from smoke. Used in conjunction with a direct cyclone-furnace boiler, the EP-MC model converts particles of burned ash to a solid mass for efficient collection. Theoretically, the MC stage works more efficiently when it follows the EP, electrode stain is less when dust first goes to the EP, and since particles are enlarged in diameter when passing through the EP, particles are more easily collected by the MC part. When used with the direct cyclone-furnace boiler, the efficiency of the collector is excellent. Only 0.2 to 0.4 g/cu m of the ashes remain uncollected. The addition of vibrators has solved the problem of ashes accumulating in the hoppers during extended periods of operation. Rubber packings of both the boiler and the collector are reinforced to prevent gas and dust leaks. The snapping of an electric discharge wire is also prevented by reinforcement. Correct voltage and current are fully observed by the machines. Efficiency of the MC phase is particularly good in this new model.

3784 APTIC NUMBER 13428

Oman, Eric
PRODUCTION OF SULPHATE CELLULOSE. (Skogasagarnas Industri. Aktiebolag, Vaxjo, Sweden) Brit. Pat. 1,042,151. 5p., Sept. 14, 1966. (Appl. March 1, 1963, 13 claims.)

The production of sulfate cellulose without malodorous compound formation by digestion of cellulosic fiber material that has been pretreated in an alkaline liquor is described. Pretreatment consists of immersion of the fiber material in a 3 to 25 gm/l NaOH solution at 100 C for 5 to 80 min. Reaction of the CH3 groups of the cellulose-containing fiber material with the alkali liquor during pretreatment prevents these groups from reacting during the subsequent sulfate digestion process, thus eliminating the formation of malodorous compounds. After pretreatment, digestion is affected in the usual manner, with white liquor mixed with black liquor. The black liquor must have a sulfide concentration lower than that required for the formation of methyl mercaptan, methyl sulfide, or methyl disulfide.

3785 APTIC NUMBER 13820

Omichi, Kisaburo

ATOMIC DUST COLLECTORS. (Atomikku shujinki ni tsuite). Text in Japanese. Kuki Seijo (Clean Air-J. Japan Air Cleaning Assoc.), 6(2):54-62, June 1968.

The components and applications of an industrial central vacuum cleaning system and an atomic dust collector are discussed. Industrial specifications are given for the vacuum cleaner. The suction of the vacuum cleaner fan is used to take in dust-laden air through a flexible hose, and only the dust is caught by the filter: effective negative pressure equals fan pressure minus (filter pressure plus hose pressure drop plus nozzle pressure drop). The central vacuum cleaning system will insure clean air in hospitals, germanium industries, etc. To avoid the exhaust flow from the cleaner, the main part of the unit is placed outside the room to be cleaned; only the flexible hose is attached to the room. This cleaner comprises a multistage turbo fan, cyclone bag filter, absorbing pipe, hose bulb, flexible hose, and brushes. Collected dusts are evacuated by washing, bucket, bag, and direct burning systems. The design of a typical installation is shown, and information is included about the schedule for the installation and the labor and tubing required. The atomic vacuum dust collector can be used to collect metallic dusts and powders. It is compact, noiseless, and easily evacuated. Detailed specifications of this collector are tabulated.

3786 APTIC NUMBER 13667

Ontario Research Foundation, Toronto
THE REMOVAL OF SULPHUR GASES FROM SMELTER FUMES. Toronto, Legislative Assembly of Ontario, 149p., 1947. 1004 refs.

Available processes for removing or recovering sulfur dioxide are briefly discussed in the main body of the report. Detailed descriptions of those processes which have reached the stage of commercial or semi-commercial development, together with information concerning cost figures and applications for the smelters of Northern Ontario, are given in an appendix. The processes covered at length include the direct production of sulfuric acid from smelter fumes, the ammonia absorption process at Trail, B.C., the anhydrous dimethylaniline process used at Selby, California, the Battersea fuel-gas lime washing process, and the Fulham lime slurry process. An account is given of the manufacture of sulfuric acid at Garfield, Utah, from sulfur dioxide contained in the waste fumes of copper converters. Processes operated on a pilot plant scale include the Hall process, the wet and dry thiogen process, and the chemical generation process developed at the University of Illinois. The Boswell Process is briefly described, and developments in processes for removing hydrogen sulfide and recovering elemental sulfur from natural gas are reported. In addition, the report contains a substantially complete list of American patents bearing on sulfur recovery from ores and waste gases, a representative list of British, German, Canadian, French, Swedish, Belgian, and Australian patents, and a selective bibliography of the literature on sulfur dioxide and related compounds.

3787 APTIC NUMBER 13830

Padovani, C.
SULFUR OXIDE EXHAUSTS FROM LARGE HEATING PLANTS: PROBLEMS AND SOLUTIONS. I. (Emissione di ossido di zolfo delle grandi centrali termiche: problemi e soluzione. I.). Text in Italian. Riv. Combust., 22(5):261-274, May 1968. 65 refs.

Sulfur dioxide is one of the most widespread air pollutants and may be found in gases vented into the air by numerous scattered sources and in gases exhausted by isolated sources, generally at high level. In the U. S., sulfur oxides constitute nearly 50% of all the air pollutants except motor vehicle exhausts. Half of these sulfur oxides are due to thermoelectric power plants, most of which are coal burning. Among the methods used to reduce the harmfulness of these exhausts, the choice of plant location has severe and obvious limits. A system generally used is the efficient dispersion of pollutants into the air through high chimneys. However, chimney effectiveness has been questioned recently in New York and New Jersey. There are also methods for reducing or eliminating sulfur oxides in stack gases. The methods include use of alkaline additives, alkalized alumina, manganese dioxide, as well as the Penelec (contact) and Reinluft (adsorption) processes. These methods may be categorized as process with or without a recovery cycle. The most important example of a wet process without recovery cycle is in Great Britain (Battersea Plant), where fumes are scrubbed with large quantities of alkalized water. Among dry processes without a recovery cycle, the most frequently adopted are those using calcium and magnesium acids, carbonates, hydrates, and even limestone and dolomite powder. Among wet processes with recovery of sulfur, the most important are those which involve the direct oxidation of SO2 to sulfuric acid. In Italy a new process is being studied under the sponsorship of the Ente Nazionale per l'Energia Elettrica. It is based on the principle of scrubbing gases with ammoniacal water which is passed continuously over alkaline beds.

3788 APTIC NUMBER 12959

Panzica, Nicholas J., Robert N. Jamison, and Emil Umbricht
HIGH CAPACITY GAS WASHER. (Ajem Laboratories, Inc., Livonia, Mich.) U. S. Pat. 3,444,669. 10p., May 20, 1969. 20 refs. (Appl. Feb. 3, 1967, 5 claims).

A gas washing device comprising a washing section, eliminator section, and blower section is described. In the washing section, a rotary spray generating system breaks up the washing liquid into droplets and hurls them across all portions of the gas flow. In this way particulates in the gas are entrapped in the droplets. The gas is then passed to the eliminator section where a number of baffles form tortuous passages. The liquid particles entrained in the gas are deposited on the baffles and then drained into a collection chamber. The gas, now substantially free from pollutants, is passed to the blower section for discharge through a stack. The blower also serves to draw the gas through the washing and eliminator sections.

3789 APTIC NUMBER 13458

Pawlikowski, Stefan, Stanislaw Aniol, and Stanislaw Bistron
EXPERIMENTS ON THE ABSORPTION BY AMMONIA OF NITROGEN OXIDES THROUGH THE USE OF NOZZLE SYSTEMS, ON A PILOT-PLANT SCALE. II. ABSORPTION BY SOLUTIONS CONTAINING AMMONIUM CARBONATE AND BICARBONATE. (Proby amoniakalnej absorpcji tlenkow azotu w ukladach dyszowych w skali poltechnicznej. II. Absorpcja roztworem zawierajacym weglan i wodoroweglan amonowy.) Text in Polish. Przemysl. Chem., 43(2):80-83, 1964. 1 ref.

Best results with respect to nitrogen oxide absorption by systems containing ammonium carbonate and bicarbonate are obtained when the NH3:CO2 ratio is set as low as possible. This results in thermal reactions which raise the temperature by only insignificant amounts, thus reducing the loss of ammonia by volatilization to 2 - 5% of bound nitrogen, vs approximately 30% by conventional absorption methods. The experimental plant, approximately one-tenth the size of a commercial installation, operated at high efficiency/ 90-99% in terms of nitrogen absorption and 70% in terms of total absorption. The yield was unaffected by changes in operating parameters over a wide range. The process is safe, even when the reactor product becomes acid.

3790 APTIC NUMBER 13674

Penny, G. W., J. T. Reese, and J. Greco
ELECTROSTATIC PRECIPITATION IN THEORY AND PRACTICE. Eng. Digest, 29(12):61-65, Dec. 1968.

Although electrostatic precipitators are generally assumed to be efficient in theory and practice, the behavior of dust on the collecting electrode constitutes a major uncertainty in their performance. Small differences in the nature of a dust can have pronounced effects on both spark-over voltage and adhesion, producing large differences in efficiency. For these reasons, and because a particle is not necessarily caught when it reaches the collecting electrode, the actual efficiencies of electrostatic precipitators bear little relation to those predicted by equations derived from calculated values of drift velocities. Important variables affecting the performance of electrostatic precipitators in power plants are sulfur content of the fuel, the exit temperature of the flue gas, the flow rate of the gas, and sulfuric acid, produced when the flue gas temperature is below acid dewpoint. Among the remedial measures undertaken by TVA to improve the efficiency of its precipitators, the removal of sulfuric acid by the injection of ammonia into the flue gas appears to be the most promising. The estimated total annual operating costs for two units will be about $40,000, a portion of which may be offset by a reduction in the high costs of induced-draft fan maintenance arising from excessive fly-ash corrosion. In addition, the possibility exists that ammonia feed rates may be reduced as much as 50% by improved methods of distributing the ammonia in the flue gas.

3791 APTIC NUMBER 13178

Peter, S. and H. Woy
SULFUR PRODUCTION FROM HYDROGEN SULFIDE WITH THE CLAUS PROCESS. (Gewinnung von Schwefel aus Schwefelwasserstoff nach dem Claus-Verfahren). Text in German. Chem. Ing. Tech., 41(1-2): 1-7, Jan. 17, 1969. 9 refs.

About 92 to 94% of sulfur is obtained from the H2S of natural gas by the Claus process. The remaining 6 to 8% sulfur is presently emitted with the waste gas as SO2. With the stringent air pollution control laws which are now being introduced in all industrial countries, it becomes necessary to increase the sulfur output to 97%. Computation of the dissociation equilibria in the sulfur vapor of the Claus process showed that higher outputs can be achieved if the gas is cooled to about 220 C prior to entering the first Claus reactor. If the reaction gas contains COS and CS2, these compounds must be hydrolyzed in the first contact process. As a consequence, the temperature in the reactor increases. With a hydrogen sulfide content of 70% by volume, the theoretical sulfur output at the first contact process would be 91%. To obtain an optimum output, the second contact process must then take place at the lowest possible temperature. The proper input temperature at the second Claus reactor was found to be 187 C. Waste gas from the second reactor is freed from the remaining elementary sulfur in a scrubber operated with liquid sulfur at 120 C and goes to an afterburner, where the remaining H2S is converted to SO2. It is theoretically and practically possible to increase the sulfur output of the Claus contact process to 97% by the use of a highly active alumina catalyst so that the SO2 concentration in the waste gas is less than 0.5% by volume. By further decreasing the operating temperature in the Claus reactors, better results could be achieved, although this is not advisable in the presence of CO2. Prerequisite to such a successful operation is the exact adjustment of the stoichiometric amount of primary air in the combustion chamber.

3792 APTIC NUMBER 12953

SOLUTION TO AIR POLLUTION. Plastics World, 27(4):58-59, April 1969.

By introducing reinforced and thermoformed plastics as fume washer construction material maintenance costs of air-pollution control systems can be reduced. In contrast to stainless steel and lead, the previously used materials, these plastics withstand a wide range of chemicals. As a result, the life span of a washer is extended. With the plastic components, the system removes 99% of contaminants from the airstream. No difficulties have been encountered in conveying fumes from the tank source through the duct system.

3793 APTIC NUMBER 12978

Babson, S. R.
VERMICULITE IN THE ABSORPTION OF GASES, VAPOURS AND FUMES. Ind. Chemist, vol. 37:219-220, May 1961.

A method for the absorption of gases in low concentration is presented. Exfoliated vermiculite is placed in horizontal beds containing 0.12 to 0.38 in. granules in a thickness of 2 ft. The vermiculite is impregnated with a liquid reagent selected according to the requirements of the gas to be absorbed. The air containing the gases to be absorbed flows downwards through the bed at 50 cu ft/m/sq ft surface giving a resistance of 2 in. wg. This corresponds to a space velocity of 1500 cu ft of gas/hr/cu ft of material. The bed remains effective for long periods depending on the reagent used and the type of gas absorbed, can be regenerated an indefinite number of times. The process has been found particularly effective for the absorption of gaseous constituents in very low concentration which are otherwise not easily absorbed in liquid solutions. Some gas mixtures successfully absorbed by this method are diesel fumes, NOX, SOX, and odors.

3794 APTIC NUMBER 13523

Rees, R. Llewellyn
THE REMOVAL OF OXIDES OF SULPHUR FROM FLUE GASES. J. Inst. Fuel, 26(3):350-357, March 1953. 44 refs.

The development of flue-gas washing at power stations came about as a result of public pressure which, it is claimed, did not distinguish sufficiently between discharges from short and tall chimneys. Modern knowledge concerning the effects of dioxide upon men and plants has yielded no evidence for the thesis that ordinary flue gas, discharged hot and at reasonably high speed from well-designed chimneys, is harmful to health or to agriculture; on the other hand, washing the flue gas, so that washing may actually increase the local pollution in certain weather conditions. It is calculated that existing gas-washing processes cost the community more than the damage done by the dioxide that they remove. These processes are wasteful in that no useful material is recovered from the flue gas. The world shortage of sulfur has given impetus to the problem of devising new processes for the recovery or its compounds from flue gas; the use of gas liquor for the manufacture of ammonium sulfate from flue gas, which is being investigated in pilot plants, may provide a limited solution to the problem, applicable at stations which are situated so that cooling the gas is not objectionable even when the fuel is rich in sulfur.

3795 APTIC NUMBER 13177

Richert, Fritz and Helmuth Althaus
WASTE GAS CLEANING CREATES WASTE WATER PROBLEM. (Abgasreinigung als Abwasserproblem). Text in German. Umschau (Frankfurt), 69(11):343, May 1969. 3 refs.

As far back as 1922 it had been pointed out that there were connections between waste gas cleaning and water pollution. About 40 years later after the reconstruction of German industry, this problem is ever more present. Regulations concerning water pollution were in effect in 1959 and 1960. Air pollution control methods are considered advantageous when substances removed from the waste gases are suitable for recovery. As an example, the removal of hydrocyanic acid from coking gases with acetone

produces acetone cyanohydrin which is needed in the manufacture of transparent plastic. If the material is not suited for recovery, it is dumped and can lead to groundwater pollution. Waste gas cleaning by scrubbers leaves a liquid waste product which goes to the digesters, or if it goes to a mechanical waste water purification plant the sludge is dumped, an equally dangerous practice. The Battersea electric power plant uses water from the Thames with ground limestone to wash the waste gases. The washing solution is then returned to the river without treatment. A good example of how air pollution control methods should be handled is provided by the steel plant in Bochum. Here the brown smoke is cleaned in scrubbers, and the sludge which accumulates goes to a settling tank where the coarse particles are removed. Next, it is mixed with the scrubbing water from the separator and dehydrated. With an iron content of about 50% in the filter cake, it is used as raw material for steel production.

3796 APTIC NUMBER 13373

Robson, Stanley
IMPROVEMENTS IN OXIDISING CATALYSTS. (Assignee not given.) Brit. Pat. 320,930. 3p., Oct. 25, 1929. (Appl. April 25, 1929, 3 claims).

A method of oxidizing sulfur dioxide to sulfur trioxide is described. The sulfur dioxide, or a sulfurous gas, is passed over a sintered iron oxide catalyst. For the best results, it is suggested that an oxide of chromium, manganese, vanadium, or zinc be mixed with the catalyst. This oxidation process can be useful in the production of sulfuric acid, hydrochloric acid, and saltcake.

3797 APTIC NUMBER 13171

Rose, Harold J. and Richard A. Glenn
COAL CLEANING IN RELATION TO SULFUR REDUCTION IN STEAM COALS. Preprint, Am. Soc. Mech. Engrs., New York, Paper 58-A-147, 20p., May 1959. 31 refs. (Presented at the Annual Meeting of the Am. Soc. Mech. Engrs., New York, Nov. 30-Dec. 5, 1958).

Presently, about 60% of the bituminous coal used in the United States is mechanically cleaned. From the operating standpoint, the cleaning of coal at about 1.60 specific gravity to remove extraneous impurities is a straight-forward process which is widely used. Under these conditions, there is efficient separation of clean and refuse, high capacity of cleaning equipment, and fairly small loss of Btu in the refuse. As effective gravity of separation is lowered to attempt more extreme cleaning, plant operation becomes more difficult, the effectiveness of separation and/or the capacity drops, and the loss of Btu in the refuse increases. Because of the chemical and physical forms in which sulfur occurs in coal, only a small to moderate proportion of the total sulfur can be removed by any known coal-cleaning process. The proportion which can be removed varies considerably with different coal beds and localities, but the proportion removed is seldom large. The maximum removal of sulfur from coal by any known cleaning process does not approach the possible removal of sulfur dioxide from the stack gases after the coal has been burned. Other approaches to the sulfur problem include the stockpiling of low-sulfur coal for use when severe smog conditions are predicted and the placing of new electric utility plants at a great enough distance from metropolitan areas to disperse stack-gas emissions. The forms of sulfur in coal, their modes of occurrence, and the amounts of each form that are present in typical coals from several states are described.

3798 APTIC NUMBER 13913

Rothe, Wilfried, Karl Achenbach, and Guenther Bretschneider
NEW PROCESS FOR DESULFURIZATION OF HYDROCARBONS AND TECHNICAL GASES. (Ein neues Verfahren zum Entschwefeln von Kohlenwasserstoffen und technischen Gasen). Text in German. Erdoel Kohle (Hamburg), 17(5):352-356, May 1964. 30 refs.

A newly developed process for refining aliphatic, naphthenic, and aromatic hydrocarbons is described. By this process, hydrogen sulfide, carbon oxysulfide, and organic sulfur compounds are removed with sodium oxide from gaseous or evaporated liquid hydrocarbons down to sulfur contents of 0.0005% by weight and better according to the equation 2Na2O plus RSR yields Na2S plus 2NaOR. In the same manner, technical gases such as nitrogen and hydrogen may be liberated from sulfur-containing impurities. The process was developed and studied in a pilot plant for about one-and-a-half years. Operating conditions, results, and economics are discussed. (Author abstract modified)

3799 APTIC NUMBER 13201

Rub, Friedmund
DUST ARRESTER INSTALLATION WITH MATERIAL RECOVERY. (Entstaubungsanlagen mit Materialruckgewinnung). Text in German. Chem. Z./Chem. App., 92(24):879-885, 1968. 1 ref.

A survey was conducted of dust arrester designs in which the dust material is recovered. The dry methods of dust separation include centrifuges, cloth filters, and electrostatic filters. The principle of operation and commercially available design variants of these three basic types are discussed.

3800 APTIC NUMBER 13334

Ruus, Av Lennart
INVESTIGATION OF ODOR ELIMINATION BY AB MORRUMS BRUK, MORRUM. (Undersokning av luktelimineringsanlaggning vid AB Morrums Bruk, Morrum). Text in Swedish. Svensk Papperstid. (Stockholm), 66(15):554-557, Aug. 15, 1963. 1 ref.

An oxidation tower system for reducing odorous compounds formed during alkaline pulping was developed by the British Columbia Research Council and installed at AB Morrums Bruk, Morrum, Sweden, where its efficiency was investigated. The system

involves the pumping of black liquor through the oxidation tower in the same direction as a gas mixture containing air, uncondensed gases from the turpentine recovery, and gases from the digester blow. After leaving the oxidation tower, the mixture is washed with chlorine and dilute sodium hydroxide in a scrubber before being vented into the atmosphere. Gas chromatographic determination of the amount of methyl mercaptan, dimethyl monosulfide, and dimethyl disulfide in the gas mixture before and after it had passed through the tower and scrubber reveals that the system removes more than 99% of the methylsulfides and more than 97% of the mercaptans. The greater part of these compounds is taken up by the black liquor in the oxidation tower; the rest is oxidized in the scrubber. The concentration of the odorous compounds in the outlet from the scrubber is very low and their smell can be characterized as 'faint'. About 90% of the sodium sulfide in the black liquor is oxidized in the oxidation tower. (Author abstract modified)

3801 APTIC NUMBER 12958

Sarto, Jorma O. and Paul G. Fouts
ENGINE EXHAUST RECIRCULATION. (Chrysler Corp., Highland Park, Mich.) U. S. Pat. 3,444,846. 6p., May 20, 1969. 6 refs. (Appl. Apr. 24, 1967, 8 claims).

A device is described for the recycling of exhaust gases in an internal combustion engine. The formation of nitrogen oxides does not become particularly objectionable until the combustion temperature exceeds about 2200 F, but the usual engine combustion temperature, which increases with engine load or the rate of acceleration at any given speed, frequently rises to about 2500 F. It is known that the recycling of at least 5% and not more than 25% of the total exhaust gases through the engine will reduce the combustion temperature to less than 2200 F. The desired result is usually obtained with the ordinary engine upon the recycling of about 15% of the total exhaust gases. The invention comprises a bypass duct connecting the exhaust and inlet headers having its opposite ends in communication with the exhaust header adjacent the hot spot and with inlet header downstream of the throttle valve, the bypass duct also having a fixed restriction dimensioned so that more than 5% but less than 25% and usually about 15% of the total exhaust gases are conducted through the bypass duct when the pressure differential between the ends corresponds to cruising or part open throttle acceleration conditions.

3802 APTIC NUMBER 13907

Scheidel, Curt
ELIMINATION OF INORGANIC EMISSIONS IN CHEMICAL ENGINEERING. (Zur Beseitigung anorganischer Emissionen in der chemischen Technik). Text in German. Dechema Monograph., 52(895-911): 229-240, 1964.

This review of gas purification with cyclones, scrubbers, cloth filters, and electrostatic precipitators mainly enumerates the advantages and disadvantages of these devices. Cyclones have the advantage of not requiring any installations for shaking off the dust as do cloth filters. However, they attain good collection efficiencies only with coarse dust particles. Scrubbers make expensive water purification necessary. Electrostatic precipitators are suitable for all particle sizes. On the whole, it can be said that the collection efficiencies of these devices have increased from 83 to 96.5% with hard coal-fired furnaces and from 90 to 98% with soft coal-fired furnaces. In a Bavarian cement factory, the first mixed bed filter (formerly a gravel bed filter) for the separation of dust has began operation. In this method, dirty gas enters the horizontal filtering chamber on a laterally arranged inlet and is cleaned in a layer of almost spherical 1.5 to 4 mm rough quartz grains preceded by a layer of steel or plastic wool. A vibrator periodically shakes off the dust. The Reinluft process is ready for practical use, and two large plants will soon be inaugurated. In this process, SO2 and SO3 are removed by adsorption on a slowly-moving activated coke bed. The sulfacid method, which converts SO2 in waste gas to sulfuric acid, has the advantage of being suitable for large and small quantities of gas.

3803 APTIC NUMBER 13202

Schmitt, Karl, Wilhelm Ester, Hans Neumann, and Harry Pauling
NITROGEN OXIDE CONVERSION. (Hibernia Chemie GmbH, Gelsenkirchen-Buer, Germany, and Harry Pauling, Munich, Germany) U. S. Pat. 3,453,071. 7p., July 1, 1969. 4 refs. (Appl. May 16, 1966, 29 claims).

In the production of nitric acid and other nitrogenous products, exhaust gas is produced which contains significant quantities of nitrogen oxides, particularly NO and NO2. A process for absorbing these oxides and recovering them as ammonium nitrite includes adjusting the mole ratio of NO to NO2 to 1 and then introducing the adjusted gas into an ammoniacal solution of ammonium nitrate. The ammonium nitrate content of the absorbent solution is controlled so that the solution viscosity at any given temperature is higher than the viscosity of water at the same temperature. When the ammonium nitrate concentration is maintained at about 40 to 50 weight percent and the absorption process is operated at 20 to 30 C, at least half the ammonium nitrite formation takes place at the liquid-vapor interface. The remainder of the ammonium nitrite is produced in the gas phase by successive absorption of small amounts of gaseous ammonia in the vapor space, where it is neutralized with water vapor and nitrogen oxide to form ammonium nitrates as well as the ammonium nitrites. These dissolve in the absorbent solution. By preventing the development of easily decomposable ammonium nitrite mists, the process minimizes efficiency losses and explosion dangers.

3804 APTIC NUMBER 12801

Schroeter, Kristian
DETERMINING AND GIVING PROOF OF COLLECTION EFFICIENCY WARRANTIES FOR ELECTROSTATIC PRECIPITATORS BY MEANS OF MATHEMATICAL STATISTICS. Staub (English Translation), 28(10):6-10, Oct. 1968. 2 refs. CFSTI TT 68-50448/10

A new method is described for designing electroprecipitators with the help of statistics. This is explained by the example of flue gas precipitators used for a steam boiler with coal dust firing and with dry ash removal. The method is also suitable for all other types of electroprecipitators. (Author Summary Modified)

3805 APTIC NUMBER 13865

Schuetze, H.
FINE PURIFICATION OF GASES WITH A HIGHLY ACTIVE COPPER CATALYST. (Feinreinigung von Gasen mit einem hochaktiven Kupferkatalysator). Text in German. Angew. Chem., 70(22-23):697-699, Nov. 26, 1958. 7 refs.

A description is given of a novel, highly active copper catalyst which is suitable for removal of O2, H2, CO, acetylene, and sulfur compounds from a large variety of gas mixtures by catalytic reaction or by absorption. The impurities are removed at relatively low temperatures, in most cases, down to the limit of detectability.

3806 APTIC NUMBER 13047

Sekikawa, Toshio
ON THE MEASUREMENT OF COLLECTING EFFICIENCY OF FILTERS FOR SUBMICRON AEROSOL PARTICLES. (Kukichu no bishoryushi ni taisuru fuiruta no hoshu koritsu no sokuteiho). Text in Japanese. Nippon Genshiryoku Gakkaishi (J. At. Energy Soc. Japan), 11(1): 8-13, Jan. 1969. 11 refs.

A new method is proposed for measuring the submicron aerosol particle collection efficiency of a mechanical filter. This method is based on the mobility spectra of ions artificially brought to charge equilibrium by means of uncharged aerosols. The results of these measurements show that even a high efficiency filter made of non-woven cloth has an average collection efficiency of only 50% for particles of approximately 0.000001 cm radius. The efficiency of such filters was lowest when collecting particles with radii between 0.000004 and 0.000005 cm. (Author abstract modified)

3807 APTIC NUMBER 13216

Selway, Jack J.
COMBINED BLAST FURNACE SCRUBBER AND DUST CATCHER. (Chemical Construction Corp., New York, N. Y.) U. S. Pat. 3,456,928. 6p., July 22, 1969. 10 refs. (Appl. May 24, 1967, 2 claims).

An apparatus is presented for quench-scrubbing of hot off-gas discharged from a blast furnace and for removing large entrained dust particles in a liquid slurry. The equipment includes an initial section for contacting hot off-gas with water. A centrally located spray nozzle sprays water into the hot gas above an annular venturi baffle. Water is discharged onto an upper annular baffle in a descending spiral liquid film from a series of ducts. The initial gas-liquid contact section terminates in a slurry retention container. The liquid slurry is removed at a controlled rate, so as to maintain a liquid phase in the container. It is suggested that the gas be further scrubbed in a horizontal conduit and a vertical venturi passage. Final washing and cooling of the gas takes place in an entrainment separation container which is vertically oriented and contains at least one layer of packing.

3808 APTIC NUMBER 13015

Shealey, Leland D.
PRECIPITATORS INSTALLED DURING NORMAL OVERHAUL. Elec. World, 171(2):32-34, Jan. 1969.

Extensive tests on the mechanical dust collectors of the South Carolina Electric and Gas Company's Urquhart Plant indicated efficiencies ranging from 30 to 56%. Inspection showed plugging and excessive wear of the collector elements. Rather than restore the collectors of their 87% maximum efficiency rate, it was decided to install electrostatic pricipitators of a guaranteed 99% efficiency. The precipitator was installed in the 75-Mw unit during the unit's outage for overhaul. The mechanical collector was removed, and the precipitator shell was fabricated on the ground and lifted into place. Installation procedures are described. The total installation time was 12 weeks and 1968 cost was $350,000. Performance was above the 99% rate expected.

3809 APTIC NUMBER 13567

Siedlewski, Janusz
THE REMOVAL OF SO2 FROM GASES THROUGH THE USE OF VARIOUS ACTIVATED CARBONS. (Badania nad usuwaniem SO2 z gazu przy uzyciu rozmych wegli aktywowanych.) Text in Polish. Przemysl Chem., 43(8): 203-207, 1964. 9 refs.

A study of four activated carbons, made respectively from semicoke from brown coal, bones, lignite, and semicoke from peat plus fruit pits, showed that all four were capable of removing SO2 from gaseous mixtures. The last two activated carbons were superior to the first two. The study indicated that adsorption and oxidation of SO2 is a pore-surface phenomenon, and that the internal pores are the more active ones. Adsorption activity increases linearly with specific surface. As the percentage of SO2 in the gas mixtures increases, the degree of surface utilization declines, rapidly at first, and then very gradually. As the grain size of the carbon increases, the degree of surface utilization decreases. As the area of pores 25 - 100 A in size increases per unit of weight, adsorption increases. For the carbons tested, 55 - 60% of the SO2 is adsorbed and the remainder oxidized to SO3.

3810 APTIC NUMBER 13568

Siedlewski, Janusz and Wojciech Michlinski
THE REMOVAL OF SO2 FROM GASES BY MEANS OF ACTIVATED CARBON. (Badania nad usuwaniem SO2 z gazow przy uzyciu wegla aktywowanego.)

Text in Polish. Przemysl Chem., 42(4-5):209-212, 1963. 14 refs.

A mixture of N2, SO2 and O2 was passed through a column filled with active carbon. The catalyst was prepared from several different materials, which yielded different distributions of pore sizes and different total pore areas per gram of activated carbon. It was found that on the average, 23% of the SO2 was catalytically oxidized to SO3, the remaining 77% being adsorbed on the surface of the activated carbon. The adsorption rate was a linear function of the number of pores in the size range of 25 to 100 A; as the number of pores of the above sizes increased from 100 to 500 per sq, the adsorption of SO2 increased from approximately 65 to 110 ml under the given experimental conditions.

3811 APTIC NUMBER 13881

Siedlewski, J.
THE REMOVAL OF SO2 FROM GAS WITH THE USE OF VARIOUS ACTIVATED CARBONS. Intern. Chem. Eng., 4(4):575-580, Oct. 1964. 9 refs. (Also: Przemysl Chemiczny, no. 4:203-207, 1967.)

The influence which covering the surface of activated carbon with sulfur has on the oxidation of SO2 to SO3 and on the efficiency of the catalyst in removing SO2 from gas was studied. Sulfur vapors applied on the surface of activated carbon did not cause any essential changes in the size of the surface or the capillary structure of the adsorbent. The sulfur did increase the number of active centers on the surface of the carbon participating in the adsorption and oxidation of SO2. The amount of surface covered by a monomolecular layer of SO2 and SO3 increased from 172.7 sq m/g for a sample without sulfur to 283 m/g for carbon containing 1.92% sulfur. This amounts to an increase in coverage of the total surface from 27.67 to 45.36%. In a sample containing 1.92% sulfur, retained SO2 increased 63.2%, consisting of 54.15% of oxidized and 69.64% of the adsorbed. Therefore the sulfur applied on the surface of the carbon causes a greater increase in active centers adsorbing SO2 than in active centers taking part in the oxidation reaction. Results also showed that covering the surface of the carbon with sulfur does not reduce, but rather increases, the possibility of oxidation of SO2 to SO3. This would indicate that, during the purification of gas from H2S, a side reaction of oxidation of the intermediate formed (SO2) can occur during the entire period of function of the catalyst.

3812 APTIC NUMBER 13811

Singhal, R. K.
FUME CLEANING SYSTEMS USED IN THE STEEL INDUSTRY- PART I. Steel Times (London), 197(8):531-538, Aug. 1969.

Fumes from a small electric arc melting furnace are collected by a full hood system without the need for cooling equipment or a combustion chamber. A semi-direct hood system comprising a main hood connected to a side door hood and port hoods is adaptable for furnaces from 6 to 30 tons. On very large furnaces, direct extraction of the fume is possible with an elbow on the furnace side or roof. Here the fume is contained in the exhaust system before it escapes from the furnace. Electrostatic precipitators find wide application in many phases of metallurgical industry operations. In the iron and steel industry, they are used on blast furnaces, open-hearth furnaces, electric arc furnaces, converters, sinter plants, deseamers, and cupolas. In the non-ferrous industry, they are used in smelting on rotary and reverberatory furnaces and in the recovery of precious metals. The removal of dust from a gas stream by electrostatic precipitation follows three steps: (1) suspended particles are negatively charged; (2) the negatively charged particles then migrate and are precipitated on positively charged collecting electrodes; and (3) precipitated particles are dislodged by rapping or washing. Wet scrubbers bring dust-laden gases in contact with a water film or spray. Some wet collectors involve cyclones or centrifuges; others, multiple sprays. Efficiency of the collectors increases with energy consumption. The range of particle size, concentration, and collector efficiency are plotted for various industries.

3813 APTIC NUMBER 13590

Sittenfield, Marcus
CHEMICAL ENGINEERING ASPECTS OF AIR POLLUTION CONTROL. Air Pollution Control Assoc. J., 8(1):68-71, May 1958.

The chemical engineering aspects of air pollution control have not been recognized fully until recent years. This resulted from the emphasis placed by the designers of control apparatus on the elimination of smoke and particulate matter from gaseous effluent. The highlights of the place chemical engineering holds in the field of air pollution control and measurement are reviewed. Industrial pollution sources and the design features which can eliminate the pollution are discussed. Ventilation systems, storage tanks, distillation units, and vacuum towers are forms of processing equipment which most often create difficulties with air pollution. When the source of pollution has been recognized and design criteria cannot completely control the emissions, control equipment must be employed. Chemical engineering plays an important role in the design and selection of the appropriate control methods which usually involve adsorption, absorption, extraction, or incineration. Application of these methods in scrubbers and combustion chambers is discussed.

3814 APTIC NUMBER 13134

Sobeck, Harold R.
CYCLONE SEPARATOR HAVING SUBSTANTIALLY CENTRALLY LOCATED OPENINGS FOR LOWERING THE PRESSURE DROP ACROSS THE CYCLONE. (North American Rockwell Corp.) U. S. Pat. 3,448,563. 5p., June 10, 1969. 20 refs. (Appl. Sept. 19, 1966, 11 claims).

A cyclone separator for cleaning gas of entrained dust and like particles is described. A novel feature of the separator is the concentric mounting of the inlet and outlet tubes, which forms an annular discharge passage for air containing

concentrated dust. A series of triangular inclined deflector blades comprise an integral deflector unit mounted at the intake of the inlet tube. The inner corners of the deflectors are secured to a baffle aligned with the outlet tube. This construction gives a relatively unobstructed intake, allowing large quantities of air to contact the deflectors with minimum pressure drop. The combination of the deflector blades and the baffle block axial gas flow, except for a series of relatively small openings located around the periphery of the baffle. Each opening is defined by the intersection of two adjacent blades and the periphery of the baffle when the cyclone is viewed from the inlet end. These openings result in further reduction in pressure drop.

3815 APTIC NUMBER 13029

Sonoda, Noboru, Naotake Matsumura, Noritaka Miyoshi, and Shigeru Tsutsumi
DESULFURIZING EFFECT OF OZONE OF LIGHT PETROLEUM DISTILLATES. (Teifutsu sekiyu ruibun no ozon ni yoru datsuryu koka). Text in Japanese. Kogyo Kagaku Zasshi (J. Chem. Soc. Japan Ind. Chem. Sect.), 72(5):1099-1101, May 1969. 12 refs.

The desulfurizing effect of ozone on light petroleum distillate and on various organic sulfur compounds was studied. The experimental procedure was to pass a stream of ozone (about 1.7 wt % of ozone) at a speed of 350 ml/min through approximately 100g of experimental light petroleum distillate (bp 95 - 240 C) at 0 C. The experimental results indicate that more than 80% of the total sulfur in the light petroleum distillate can be removed by ozonization. Ninety % of the ozonized petroleum can be recovered. This recovery percentage can be obtained by dividing the ozonized petroleum by the experimental petroleum and multiplying by 100. The reactivity of sulfur compounds for ozone in desulfurization was found to decrease in the order of sulfides and thiols, thiphene, benzothiophene, hydrogen sulfide, elemental sulfur, and disulfides. The result also indicated that the rate of ozonization was in the order of thiols, hydrogen sulfide thiophene, elemental sulfur, sulfides, benzothiophene, and disulfides. Although the rate of ozonization of hydrogen sulfide is high, its desulfurizing effect is low, while the reverse is true of the rate of ozonization and desulfurizing effect of sulfides. Sulfur dioxide was produced in the process of ozonization of various sulfur compounds. The significant amount of the gas was observed especially out of hydrogen sulfide and elemental sulfur.

3816 APTIC NUMBER 12988

Staubing, Peter
AIR CLEANING IN DRINKING WATER PLANTS. (Luftreinigung in Wasserwerken). Text in German. Wasser Luft Betrieb, 12(10): 614-617, Oct. 1968. 3 refs.

Under present circumstances, our atmospheric air contains in general about 0.5 to 3 mg dust/cu m. For the preparation of drinking water, this means that at a volume flow of 100,000 cu m air/hr for aeration, 50 g of pollutants would be carried into the water per hour. Since this amount far exceeds the tolerance limit, dust separators must be used to clean the air prior to its use for aeration. Various filters are used for this purpose. Wire screen filters which had been wetted with a viscous wetting agent did not have satisfactory collection efficiencies. Moreover, it is very likely that oil vapors from the wetting agent are carried off in the cleaned air. Bactericidal dust-binding agents are not ideal for this purpose either. It is thought that atmospheric air carries about 1000 to 10,000 germs/cu m, which usually cling to dust particles. Practice has shown that bactericidal binding agents prevent further development of the retained germs, but the finest particles which are germ carriers may pass unimpaired. Fiber filters are thought to have all the qualities needed to clean air satisfactorily. They are capable of separating the finest particles. Dust separation by such filters is based on effects such as sifting, sedimentation, inertia, blocking, and diffusion. The flow rate is of some importance for the collection efficiency of a fiber filter, and it should not exceed 2.5 m/sec. Break-through of dust and fuzzing are indications of improper filter operation. To avoid corrosion of the filters, an epoxy ester coating is recommended. Electrostatic precipitators cannot be used in drinking water preparation plants, since they are too sensitive to the high humidity prevailing in such plants.

3817 APTIC NUMBER 13019

Stelle, William W.
TALLEST SMOKE STACK FOR MITCHELL PLANT. Civil Eng. ASCE, 39(3): 44-47, March 1969.

A 1200 ft smoke stack is under construction at the Mitchell Plant of the Appalachian Power Company. The tall chimney is designed to pierce possible low level inversion blankets and discharge emissions to the atmosphere above. The height of the tower was calculated using the Bosanquet, Carey, and Halton equation to determine plume rise, and the Sutton equation for finding ground levels of sulfur dioxide. The stack will satisfactorily discharge and diffuse some 15 million lb of hot flue gases/hr. A slip form method of construction is being used for the concrete shell and steel lining.

3818 APTIC NUMBER 13828

Stephan, David G.
RECENT AIR POLLUTION CONTROL DEVELOPMENTS: A REVIEW OF PUBLISHED INFORMATION. Chem. Eng. Progr. Symp. Ser., 57(35):39-50, 1961. 336 refs.

In this review and bibliography of 336 articles on air pollution control published from August 1958 through July 1960, most of the articles are within five categories: research reports, descriptions of specific control installations, discussion of controls for a particular industry or a given process, discussions of a class of control device or techniques, or descriptions of control equipment. The remaining papers are general discussions of pollution problems or control devices.

Those articles describing research results and those of a general nature are reviewed. These and the remaining references are included in a subject index keyed to a complete bibliography. This presentation is designed to provide chemical engineers with a guide to recent developments and to assist them in solving their own pollution problems.

3819 APTIC NUMBER 13144

Stephens, Ruth E., Daniel A. Hirschler, Jr., and Frances W. Lamb
OXIDATION CATALYSTS. (Ethyl Corp., New York, N. Y.) U. S. Pat. 3,447,893. 8p., June 3, 1969. 7 refs. (Appl. Feb. 4, 1966, 8 claims).

In purification of exhaust gases from an internal combustion engine, a catalyst must operate effectively under a range of temperatures from 400 to 1800 F. A method is presented for oxidation of the unburned hydrocarbons and the carbon monoxide components of exhaust gas. The exhaust gas is contacted with a catalyst consisting of a transitional alumina support containing from 0.01 to 5 wt % silica, and as a catalytic agent, copper oxide containing 0.5 to 25 wt % copper and 0.5 to 10 wt % cobalt or silver and a combination of cobalt and vanadium in oxide form. The catalyst will operate at the required range of temperatures, oxidizing the carbon monoxide and unburned hydrocarbons.

3820 APTIC NUMBER 13535

Straschill, Max
THE REPROCESSING OF NITROGEN OXIDE-CONTAINING WASTE GASES IN PICKLING PLANTS. (Die Aufarbeitung nitrosehaltiger Abgase in Beizereien.) Text in German. Metall-Reinigung Vorbehandlung, 12(11):210-211, Nov. 1963. 3 refs.

The most practical method for detoxification of the nitrogen oxides that are present in pickling plant waste gases is through absorption and decomposition in aqueous solutions of alkalies, urea, aminosulfonic acid or ammonia. Of these, the ammonia process, in which a mixture of the waste gases and ammonia is passed through an activated charcoal filter, possesses the advantage that the reaction which takes place at the filter yields stable ammonium salts. These do not attack the activated charcoal, and may be removed by scrubbing, thus restoring the efficiency of the filter. Other procedures, such as adsorption of the nitrogen oxides on activated charcoal, activated alumina, and activated silica are effective but rather expensive.

3821 APTIC NUMBER 12800

Strauss, Hans-Jochen
THE PRESENT SITUATION IN THE FIELD OF AIR FILTER TESTING. Staub (English Translation), 28(10):1-6, Oct. 1968. 2 refs.
CFSTI TT 68-50448/10

A survey of the present situation in the field of air filter testing is presented. The test methods should give three kinds of essential information: (1) resistance of clean filter medium; (2) dust removal capacity or efficiency of the filter, if possible as a function of the dust accumulated; (3) changes in filter resistance in the case of dust accumulation. Only if these three kinds of information are jointly considered, is it possible to access a filter medium and to solve problems of economy associated with the use of an air filter. (Author Summary Modified)

3822 APTIC NUMBER 13127

Svajgl, Oldrich
HYDROGENATION CRACKING OF DIESEL OIL FROM ROHASHKINO PETROLEUM. (Hydrogenacni stepeni motorove nafty z romashkinske ropy). Text in Czech. Chem. Prumysl, 19(3):103-106, 1969. 11 refs.

Experiments are described on the hydrogenation cracking of sulfur-containing Diesel oil having 50 ppm of chemically bound nitrogen. The hydrogenation cracking succeeded at a pressure of 300 atm with a common wolfram catalyst preceded by a hydrogenation refining catalyst. The resulting gasoline and Diesel oil have low sulfur contents and are of better quality than the primary products. The harmful effect of ammonia, which originates from the nitrogen-containing substances, can be eliminated by elevating the temperature. It has been verified that sulfur in Diesel oil activates the cracking catalyst. (Author summary modified)

3823 APTIC NUMBER 13782

Swinarski, A. and J. Siedlewski
FRACTIONATION OF ACTIVATED CARBON VIA FLUIDIZATION. Int. Chem. Eng., 2(3):342-348, July 1962. 10 refs. (Also: Przemysl Chem., 40(11):651, 1961).

A method for the separation of activated carbon particles with identical outside dimensions into fractions containing different proportions of micro- and macropores is described. The fractionation apparatus comprises a flowmeter for measuring constant controlled air flow, a vertical fractionating tube with top and bottom receivers, and a feed storage vessel for activated carbon. A uniform slow stream of activated carbon is introduced into the fractionating tube from the feed storage. During fractionation, heavier particles fall into the bottom receiver; lighter particles are entrained by the air stream and collection in the top receiver. Tests have confirmed the investigators' previous hypothesis that the catalytic activity of carbon is directly proportional to the surface formed by pores with diameters in the 35 to 80 A range. Since the method increases the desulfurization capabilities of carbon, it has wide applications for the industrial desulfurization of gases.

3824 APTIC NUMBER 13363

Taylor, Herbert E. and David R. Pearl

INCINERATOR DRAFT CONTROL AND VENT VALVE. (Combustion Engineering Inc. Windsor, Conn.) U. S. Pat. 3,447,493. 4p., June 3, 1969. 3 refs. (Appl. Dec. 28, 1967, 2 claims).

A combined incinerator and wet scrubber are discussed. The hot, dust-laden gases from the incinerator are scrubbed and cleaned in the scrubber and flow through a space enclosed by a double wall arrangement of the incinerator. A damper valve, positioned in the duct between the incinerator and the wet scrubber, maintains the incinerator at a predetermined partial vacuum during normal operations. This enables the refuse to be burned without smoke escaping from the furnace doors, joints, or seams. The valve also closes the duct when a maximum temperature is reached downstream from the wet scrubber. This prevents any hot gases from the furnace from entering the scrubber. Cold atmospheric air flows through the scrubber and the double walls of the furnace, thus preventing any overheating or damage. (Author abstract modified)

3825 APTIC NUMBER 12581

SULFUR OXIDE REMOVAL FROM POWER PLANT STACK GAS. USE OF LIMESTONE IN WET-SCRUBBING PROCESS. Tennessee Valley Authority, 104p., 1969. 22 refs.
CFSTI: PB 183908

A report is presented of a conceptual design and cost study made on methods for removing sulfur oxides from power plant stack gases. The purpose is to develop, for various promising processes, the best design possible from existing data, estimate capital and operating costs on a uniform basis, and recommend further research and development needed. This is the second study in the series; the first was an evaluation of the dry limestone method-injection of limestone into the boiler without subsequent wet scrubbing. One of the objectives in the present study is to compare the merits of the wet and dry processes.

3826 APTIC NUMBER 13090

Thomas, Dean G.
EXHAUST MUFFLER WITH REMOVABLE CATALYTIC UNIT. (Nelson Muffler Corp., Stoughton, Wisc.) U. S. Pat. 3,445,196. 5p., May 20, 1969. 6 refs. (Appl. June 6, 1966, 9 claims).

A catalytic exhaust muffler which is arranged for easy removal of the catalyst as a single unit is described. A catalyst container is mounted in a hollow muffler shell. A baffle arrangement is situated in the shell to direct exhaust gases from an inlet through the catalyst container and to an exhaust outlet. The catalytically active body within the container comprises a number of axially aligned discs. The apparatus provided for utilizing the catalyst includes screens disposed at opposite ends of the body, and a post passing through the catalyst which engages at least one of the screens. The post has a crossbar end which is adjacent to the cover of the catalyst container. When the catalytic unit is removed from the exhaust muffler, the cover is snapped off the exposed end of the container, and the crossbar is grasped to permit pulling the unit out of the container.

3827 APTIC NUMBER 13570

Tiegan, J. W.
THE SULFUR PROBLEM IN COAL: WHAT'S BEING DONE TO GET RID OF IT. Preprint, Bituminous Coal Research, Inc., Monroeville, Pa., 9p., 1967. (Presented at the Industrial Coal Conference, (Kentucky Univ.), April 12-13, 1967.)

From washability studies, petrographic analyses, and pulverization studies concerning the desulfurization of coal, it has been concluded that for improved pyrite removal, coal should be cleaned during or after pulverization at the power station. As a result of these findings, Bituminous Coal Research (BCR) investigated a two-stage process for cleaning coal using air classification and electrostatic separation. The air classifier was shown to be a good pyrite separator, but electrostatic cleaning was not successful. BCR then investigated the pulverizer itself for pyrite removal. Adjustments of the roll pressure increased the rejects through the tramp iron chute of the pulverizer to obtain a 25 to 35% reduction in the total sulfur content of the coal. Coarse materials from the air classifier that could not be cleaned by electrostatic separation were successfully cleaned by a wet method employing a filter rather than a dryer. It has been shown that the pulverizer alone can reduce the total sulfur content from 3.96 to 3.03%. If, in addition, the BCR two-stage system (air classification and wet cleaning) is used, the sulfur content of the coal can be reduced to 1.92%.

3828 APTIC NUMBER 13827

Tix, Werner, Klaus-Dieter Lanke, and Egon-Rudiger Strich
ALL-METAL CATALYSTS FOR WASTE GAS PURIFICATION. (Ganzmetallkatalysatoren fur die Abgasreinigung). Text in German. Chem. Tech. Berlin, 20(11):697, Nov. 1968. 2 refs.

A new noble-metal catalyst with a base of high-temperature resistant metallic carrier and devices in which this catalyst is incorporated were developed. Samples of this catalyst have been in continuous use for more than 6 months for catalytic afterburning of solvent vapors (benzol, phenol, cresol) present in the dryer exhaust air of resin-coated wire machines. With solvent contents varying between 8 and 25 g/cu m and with loads varying between 10,000 and 20,000 v/v hr, a combustion efficiency of 0.99 is attained. The ignition temperature of the catalyst lies between 320 and 340 C, and its optimal working temperature is between 600 and 800 C. An operating life of two years may be expected on the basis of test results. The production of the new catalyst will start in 1968 in the VEB Leuna-Werke 'Walter Ulbricht'. The use of this catalyst results, in detorification and deodorizing of the waste air, due to recovery of the sensible heat of the dryer exhaust air and of the heat of combustion of the solvents, in an appreciable increase of production and lowering of the specific energy consumption.

3829 APTIC NUMBER 13372

Trendafelov, D., B. Popyankov, and A. Zapryanova
ON THE EXTRACTION OF SULFUR DIOXIDE FROM EXHAUST GASES. (K'm b'prosa za isvlichaneto na sernija dvuokis iz dimnite gazove). Text in Bulgarian. Khim. Ind. (Sofia), 35(1):3-5, 1963. 11 refs.

Absorption of SO2 in Na2CO3 solutions and equilibrium solid phases occurring in the ternary water-salt system Na2SO3-Na2CO3-H2O at 50 deg was studied and absorption was found to be complete. The diagram of state consists of three monovariant curves. Equilibrium solid phases of the system are Na2SO3 (to 7.35%), solid solution (7.35-6.02% Na2SO3 and 26.36-28.98% Na2CO3), and Na2CO3-H2O (above 30.64%).

3830 APTIC NUMBER 13068

Trobisch, K.
OXIDATION PROCESSES FOR PURIFYING EXHAUST GASES OF CHEMICAL INDUSTRIES. (Procedimenti ossidativi per purificare gli effluenti gassosi nell'industria chimica). Text in Italian. Riv. Combust., 23(1):16-21, Jan. 1969.

Many industrial exhaust gases contribute to air pollution. There are various systems to purify these gases before they are vented into the surrounding air. Among them is chemical oxidation at normal temperature, a process in which the gas is scrubbed with oxiding solutions such as hypochlorites, chlorites, and permanganate. This process is used primarily to purify malodorous gases. Chemical oxidation at high temperature is achieved by thermic combustion, by torches, by incinerators, or by catalytic oxidation. Thermic combustion is used when the gas has a calorific power permitting an open flame combustion. Torches may be used under conditions of flame steadiness, smokeless combustion, flame low brightness, etc. Incinerators are used for gases without enough power to burn at open flame. Catalytic oxidation is used for gases exhaled by combustible materials when their calorific power is insufficient for combustion unless another substance is added. This system is used mainly to purify gases emitted by petrochemical plants. The biological oxidation system is used to eliminate the odor emitted by organic substances. In this case, gases are strained through a humid, stratified filtering mass containing highly concentrated bacteria which consume organic substances as food.

3831 APTIC NUMBER 13899

Varlamov, M. L., G. A. Manakin, Ya. I. Staromel'skiy, and L. S. Zbrozhek
INVESTIGATION OF THE AMMONIA METHOD OF REMOVING NITROGEN OXIDES FROM THE EXHAUST GASES OF A NITROGEN-OXIDE NITRIC-ACID TOWER SYSTEM. I. (Issledovaniye ammiachnogo metoda ochistki ot okislov azota otkhodyashchikh gazov bashennoy nitroznoy sernokislotnoy sistemy). Text in Russian. Nauchn. Zap. Odessk. Politekhn. Inst., vol. 40:28-33, 1962. 4 refs.

Data from laboratory study of the removal of low concentrations of nitrogen oxides using gaseous ammonia and ammonia water are presented. The use of gaseous ammonia, in conjunction with acoustic coagulation with an aerosol, yielded an average degree of removal of 85% when incoming gases were highly oxidized. Nitrogen dioxide, and an equimolecular mixture of NO and NO2, reacted with 82-93% completeness with gaseous ammonia, this value increasing slightly with increased reaction volume. A gas lift using ammonia water yielded 63.6% purification with a 40% content of nitrogen oxides. The degree of oxidation of industrial exhaust gases is an important factor determining the degree of purification by this method. The data given correspond to an equimolecular NO and NO2 mixture.

3832 APTIC NUMBER 13826

Vlcek, J. G. and R. A. Graff
GLOBE SOLVES PRESSING AIR-POLLUTION PROBLEM WITH NEW-TYPE SULFUR-RECOVERY UNIT. Oil Gas J., 52(9):64-65, 98-99, July 6, 1953.

A process is described for the recovery of 15 t/day of high-purity sulfur, using a modified Claus process. A hydrogen sulfide-carbon dioxide gas mixture from the desulfurization unit is divided into two streams, and a one-third portion is burned in the firebox of the steam boiler along with the theoretical quantity of air required to produce sulfur dioxide. The sulfur dioxide is then mixed with the remaining two-thirds gas stream, and passed to a first-stage catalytic converter, where H2S and SO2 react to form elemental sulfur and water vapor. The reacted vapors leaving the base of the first stage of the catalytic converter then pass to the first-stage portion of a sulfur contact cooler, where the vapors are cooled and the sulfur is condensed. After sulfur removal, the cooled gas is then reheated to reaction temperature by means of a direct-fire hydrogen sulfide-air burner and passed through a second-stage catalytic converter for final reaction of unconverted H2S and SO2. The reaction products leaving the second-stage catalytic converter are cooled and condensed in a second-stage cooler, using a recirculating stream of molten sulfur, and the condensed sulfur is pumped to a steam-heated sulfur storage tank. The waste gases, consisting largely of carbon dioxide, nitrogen, and water vapor, are vented to the atmosphere at the top of the sulfur contact condenser.

3833 APTIC NUMBER 13708

Wakabayashi, Tetsuo
REMOVAL OF SULFUR OXIDES IN COMBUSTION WASTE GAS. II. (Nensho hai gasu chu no iou sanka butsu no jokyo (II)). Text in Japanese. Koatsu Gasu Kyokaishi (J. Soc. High Pressure Gas Ind.), 4(1):41-47, 1967.

Sulfur dioxide oxidation, activated carbon adsorption, and other methods for removing sulfur oxides from waste gas are discussed. The Takeuchi process is based on the ability of activated carbon to adsorb SO2 at around 200 C, as well as at 50 C. Through the action of the oxygen remaining in the gas, the adsorbed SO2 is converted to SO3. The carbon is reactivated by liquid ammonia,

which converts the SO3 to ammonium sulfate liquid. The Reinluft process uses cheaper semicokes as the adsorbent, rather than activated carbon. Sulfur dioxide removal is obtained through dissolution at 350-400 C of the sulfuric acid formed from the SO2 adsorbed on the semicokes at 160 C, the waste gas temperature of general boilers. It has been experimentally observed that semicokes from lignite can remove 80% of the SO2 when adsorption is carried out in a fixed bed process. In SO2 oxidation processes, waste gas is passed through electrical precipitators and SO2 is converted to SO3 by catalytic oxidation. A Pennsylvania power plant process uses vanadium oxide as a catalyst to produce sulfuric acid. The Kyoura process is similar but produces both ammonium sulfate and sulfuric acid.

3834 APTIC NUMBER 13071

Wall, Marvin P.
METHOD OF AND APPARATUS FOR INCREASING THE EFFICIENCY OF COMBUSTION ENGINES. (Assignee not given.) U. S. Pat. 3,446,013. 10p., May 27, 1969. 7 refs. (Appl. April 18, 1967, 15 claims).

Present combustion engines burn fuel in a working cylinder at substantially constant volume. The fuel may burn so rapidly that the temperature of reaction is high enough to cause dissociation of some of the products until an equilibrium is established between the tendency to dissociate and recombine at the equilibrium temperature. This results in ignition lag and incomplete combustion, with resulting engine inefficiency and smog formation. In the present invention, dissociation is controlled by controlling the combustion temperature through expanding the burning mixture into the working cylinder clearance volume of the working cylinder during combustion. The fuel combustion temperature is established below the fuel dissociation temperature by expanding the burning mixture into the working cylinder clearance volume by a timed transfer valve. The chemical composition of the engine exhaust products is controlled by establishing combustion temperature below the dissociation temperature and smog-producing constituents are eliminated.

3835 APTIC NUMBER 13522

Wallis, E
ATMOSPHERIC POLLUTION AND THE ZINC INDUSTRY. Chem. Ind. (London), No. 41, 1271-1273, Oct. 1955.

The efforts of the zinc industry in the past few years to increase production of existing plants have necessitated the solution of two major problems: (1) the improved collection of sinter plant dust; and (2) the treatment of exit gases from contact sulphuric acid plant. Zinc sulphide ores, mainly imported zinc concentrates containing approximately 52% zinc, 21% sulphur, 0.2% cadmium and 1.5% lead, are treated on Dwight Lloyd Sintering machines in order to produce a sinter suitable for subsequent treatment in horizontal or vertical distillation plant where zinc will be recovered from the ore. During this operation sulphur dioxide is produced which is converted into sulphuric acid in contact plants. A plant was designed to take the exit gas from the main and to scrub out SO2 and some SO3 contents of the gas. The plant comprises three main sections: a scrubbing section, a decomposing section, and a crystallizing section. It could not be expected that absorption of SO2 at very low concentration would be a very profitable operation unless great attention were paid to detail in design to ensure the greatest possible efficiency and economy in operation. This plant operates as designed with only relatively minor alterations to inlet and distributing devices, and satisfactory ammonia recoveries obtained.

3836 APTIC NUMBER 13172

Wasilewska, J. and U. Krause
INVESTIGATIONS ON THE OPERATING EFFICIENCY OF BLAST FURNACE GAS CLEANING PLANT. (Badanie sprawnosci dzialania urzadzen do odpylania gazu wielkopiecowego). Text in Polish. Prace Inst. Hutniczych, 21(1):23-27, 1969. 5 refs.

Investigations concerned the operating efficiency of a blast furnace gas cleaning plant during the manufacture of open-hearth pig iron and ferro-manganese pig iron. Trials determined optimum gas cleaning conditions in a conventional spray tower and Dingler-type disintegrator with reference to specific water consumption rates. It was found that at a blast rate of about 78,500 cu nm/h, the mean cleaning efficiency of the washer varied from 94.4 to 96.6%. Dust concentration in the gas leaving the washer was 890 to 640 mg/cu nm. At a blast rate of about 78,400 cu nm/h, the cleaning efficiency of the disintegrator varied from 97.9 to 99.1%. Electric power consumption varied according to the amount of water supplied to the disintegrator from 24.3 to 27.6 MJ/1000 cu nm of gas. Dust concentration in the gas leaving the disintegrator varied from 16 to 9 mg/cu nm of gas. Optimum operating conditions suitable for the disintegrator to reach 8000 cu nm/h rated capacity were achieved at the specific water consumption rate of about 0.74 cu nm/1000 cu nm of gas. (Author summary modified)

3837 APTIC NUMBER 13108

Wegman, Leonard S.
WHAT YOU SHOULD KNOW ABOUT SELECTING AIR POLLUTION CONTROL EQUIPMENT. Mod. Mfg., 2(8):164-165, Aug. 1969.

Prominent among air pollution control equipment are devices for removing particulate matter. Generally, they are mechanical collectors, electrostatic precipitators, wet scrubbers, and filters. Gravity settling collectors utilize lowered gas velocity and sharp changes in gas direction to deflect particles from the air stream. Centrifugal collectors contain no moving parts, and they have collection efficiencies up to 99.5% in the 10 micron range. In cleaning gases by electrostatic precipitation, a high voltage (20,000 to 60,000 V) is impressed across a pair of electrodes. Precipitators offer a means of handling very large volumes of gas at high efficiencies (99.5%). Wet scrubbers remove dust from the gas stream by impaction of the particles on liquid droplets. High collision forces cause particles to lodge within the droplets, which are then removed by impaction or flushing, plus gravity or inertial separation. Collection efficiency is a function of both the frequency and

energy of impaction. Filters are porous units operating on collection accomplished by sieving. This approach offers the the highest collection efficiencies (up to 99.9%), but it also introduces the problem of constant removal of collected matter or replacement of the filter media to maintain gas flow.

3838 APTIC NUMBER 13409

Wenzl, Herman F. J. and O. V. Ingruber
BLACK LIQUOR BURNING AND CHEMICAL MADE-UP. Paper Trade J., 150(50):54-57, December 12, 1966. 29 refs.

A new proposal for maintaining sulfidity in the kraft process assumes that multistage bleaching of kraft pulp uses mainly chlorine and chlorine dioxide obtained from the reaction of sodium chlorate with sulfuric acid. In addition to chlorine and chlorine dioxide, large amounts of sodium sulfate are formed. The proposal also suggests the use of white liquor instead of sodium hydroxide in the alkaline extraction stages of bleaching. The heart of the recovery system is the steam boiler. Apart from the recovery of inorganic components from the combustion of waste liquor in the form of a smelt, the organic substances in the black liquor are burned in the same process and their heat is used for steam generation covering the heat and energy requirements of the whole mill. Presently, recovery boilers for 1000 tons of pulp per day are in operation. One unit is designed for a throughput of 1340 tons of dry substance per day at a dry content of 65-68% of the injected liquor. Steam production is 225 tons/hr at 600 psig pressure and 380 C exit temperature. To remove the smelt uniformly, the number of smelt spouts has been increased. Explosions which occur when smelt enters dissolving tanks are probably related to the formation of elemental sulfur. About 95% of the suspended particles from hot furnace gases can be recovered with scrubbers consisting of cylindrical upright tanks. Gas is blown tangentially at high velocity into the tank bottom while water is sprayed from a tube with large numbers of spray nozzles. Water is recycled from the bottom to the spray tube.

3839 APTIC NUMBER 13464

Wenzl, Hermann F. J.
CAUSTICIZING AND CLARIFYING KRAFT PULPING LIQUORS. Paper Trade J., 151(2):50-53, Jan. 9, 1967. 12 refs.

Causticizing of green and white liquors can be expressed as CaO # H2O # Na2CO3 yields 2NaOH # CaCO3. The reaction is reversible, and even under favorable conditions, no more than 85-90% conversion is achieved. The incomplete reaction is due either to the increasing solubility of calcium carbonate with increasing amounts of hydroxyl ions in solution or to the fact that it occurs on the surface of suspended lime particles which lose their reactivity as they become covered with a layer of CaCO3. The clarification of green liquor is improved by the addition of lime, but increased amounts of mud must be washed. Attempts to dry lime mud with hot gases have led to the development of the flash drying process, in which a portion of collected lime of 90-99% dry content is mixed with wet mud coming from washers to increase the dry content of the lime. In one installation the equipment has increased kiln efficiency 100%. However, the operation of a fluidized bed calciner may be simpler than that of a kiln and less sensitive to changes in throughput. A modified Pease-Anthony venturi scrubber has an efficiency between 94.0 and 98.5%.

3840 APTIC NUMBER 13921

Wiedemann, C. R.
A DISCUSSION OF SOME CUPOLA DUST COLLECTION SYSTEMS. PART I. Mod. Castings, 56(3):71-73, Sept. 1969.

As long as the foundry cupola remains the prime source of cast iron, the total cupola system will require highly efficient and expensive dust collection equipment to meet Federal, state, and local air pollution ordinances. To produce 25 tons of molten iron in one hour, a cupola uses 51,600 lb of air to support combustion of the coke necessary to generate the required heat. In the same hour, a dust collector must handle at least 240,000 lbs of air for ample control of smoke and dust. Though sensitive to high temperatures and requiring a number of safeguards, the cloth filter is the most efficient dust collector available for cupolas. Based on initial capital investment, it is competitive with wet scrubbers and electrostatic precipitators. On the basis of air flow, temperature, pressure drop, and fan brake horsepower specifications, it is assumed that a cloth filter will clean 26 lbs/min of dust-laden air per fan brake horsepower to a maximum effluent density of 0.03 grains per scf. Measures are presented for controlling filter temperature, determining the amount of sulfur present in iron and cast steel, and utilizing the dry dust collected by the filter.

3841 APTIC NUMBER 13434

Wiemann, Hans Jurgen and Wilhelm Jugel
DEVELOPMENT OF A TRANSPORTABLE ELECTROSTATIC AIR PURIFIER. (Entwicklung eines transportablen elektrostatisch arbeitenden Luftreinigungsgerates.) Text in German. Wiss. Z., 11(1):69-72, 1969. 10 refs.

A light-weight electrostatic precipitator for industrial and office use, designed to remove pollen, is described. It consists of four sections: the filter cell, including an ionization and precipitation zone; a high-voltage system, a fan, and the housing. Aluminum and plastics were used to reduce weight. The weight of the high voltage unit was kept low by employing a saw-tooth generator and circuits similar to the horizontal scanners and picture-tube anode circuits in television sets. Tests of the pollen-removal capacity of the system, using Lycopodium to simulate pollen, indicate that the air cleaner should be 99% efficient. High separation rates were also obtained with respect to fly ashes and polyacrylonitrile dust. The prototype yielded encouraging results, but further tests with other dusts, and further improvement in the technical aspects of the apparatus are considered necessary.

3842 APTIC NUMBER 13639

Wilson, Edwin B., Joseph W. Leonard, Richard C. Ulmer, Robert P. Hensel, and Richard W. Borio
REDUCING THE CORROSIVE PROPERTIES OF UTILITY COALS THROUGH MODIFICATION OF CURRENT COAL CLEANING PRACTICES. West Virginia Univ., Morgantown, Coal Research Bureau TB 32, 16p., Sept. 25, 1967.

By regarding ash, sulfur, and alkali minerals of coal as boiler corrosion-promoting constituents and the alkaline-earth minerals of coal as boiler corrosion-retarding constituents, it is possible to demonstrate the extent to which these minerals can be concentrated or reduced within selected size and/or specific gravity (sg) fractions of coal to yield a product which is substantially less corrosive. These results can be brought about by modifying current coal-cleaning practices and are often attainable without sacrificing the standard indicators of coal-cleaning performance--ash, sulfur, and recovery. Coal-associated minerals which occur in nature might be mined and processed at the coal mine for subsequent addition to the product where cleaning procedures to reduce corrosion prove to be inadequate. Studies have shown that an increase of 1% in the alkaline-earth content of the coal can yield 25% reduction in the corrosion, rate while a decrease of 0.1% in the sodium oxide content of the coal can yield a 20% reduction in corrosion rate. It is impossible to predict the direction of change in concentration of these minerals which results from changes to the sg of separation. A knowledge of both the direction and magnitude of change in the concentration of minerals which affect corrosion is necessary. Coal-cleaning schemes must be developed from detailed knowledge of the coal seam to be mined. Successful application of the cleaning measures described could possibly reduce boiler maintenance at power plants and lead to reciprocal premium-price arrangements for such coals.

3843 APTIC NUMBER 13867

Wise, Clare E.
STEAM IS BACK. Machine Design, vol. 40:20-26, Aug. 29, 1968.

The steam engine is being studied on a greater scale for use as an automotive propulsion unit. Air pollution is the primary reason. At least a half-dozen steam engines designed specifically for vehicle propulsion are now in various stages of development. Probably the best known contemporary steam powerplant is the Williams engine. Tests run on this engine have shown that the hydrocarbon emissions were 30 to 40 ppm, compared to the 275 ppm required in the 1968 cars. Carbon monoxide level was 0.3%, one-fifth of the 1.5% limit. Oxides of nitrogen in the Williams engine exhaust range between 25 and 35 ppm, while present vehicles emit between 1500 and 3000 ppm. The major obstacle to acceptance appears to be its public image, which dates from the steamers of the 1920's. These cars required 25 to 45 min warmup, consumed inordinate amounts of water, and used boilers which were extremely heavy and potentially dangerous. The opposition to the steam engine in the auto and associated industries arises primarily from economic reasons. One in every five to 10 people in the U. S. derives his livelihood from some facet of the auto industry. The aftermarket in mufflers alone is a multi-million dollar business. Billions of dollars are involved in the sparkplug, carburetor, and gasoline businesses. Retooling by the auto industry to produce steam engines would represent a very small portion of the total loss suffered by industry suppliers and those in the aftermarket business.

3844 APTIC NUMBER 13466

Wollmann, Edmund P.
EXHAUST GAS PURIFICATION AND FILTRATION DEVICE. (Assignee not given.) U. S. Pat. 3,392,968. 4p., July 16, 1968. 6 refs. (Appl. Aug. 3, 1966, 10 claims.)

A two-unit gas purification and filtration device which is primarily designed for industrial use but is adaptable for automotive use is described. The device consists of two main washing tanks. The first tank withdraws solid particles from the gases. To insure complete absorption, the partially purified gas is directed to the second tank for the dissolution or precipitation of other solids or contaminates which have not been previously removed. The invention is unique in that the compressed air used during the operation does not mix with and is not contaminated by the exhaust gas.

3845 APTIC NUMBER 13831

Yamada, Takeshi
REMOVAL OF SULFUR OXIDES IN EXHAUST GAS. (Nensho haigasu chu no yuo sankabutsu no jokyo). Text in Japanese. Nippon Kikai Gakkai-Shi (J. Japan. Soc. Mech. Engr., Tokyo), 67(541):265-270, Feb. 1964. 6 refs.

Sulfur oxides (mainly SO2) in exhaust gas of crude petroleum can be removed only by two chemical procedures. In the first, SO2 gas is removed by alkaline solutions such as limewater, ammoniacal solution, or sodium sulfite solution. The SO2 removal efficiency ranges from 70 to 90%, and this procedure is performed in several steam power plants in England, including Battersea (lime), Bankside (lime), and North Wilford (ammonia). The procedure, however, needs expensive equipment which costs about 10 to 20% of total cost for steam-power-plant construction. Small amounts of SO2 gas can also pollute the air in a localized area because the temperature of the exhaust gas is lowered by the procedure and the gas may pollute the air around the chimney. In the second procedure, SO2 gas is adsorbed by oxidized metals (Al2O3, MnO2, NaO, KO, LiO) or activated carbon (carbon, coke, coalite). The SO2 adsorption efficiency with this procedure ranges from 83 to 90% unless the amount of exhaust gas is excessive. Efficiency of these adsorbents to remove SO2 also falls rapidly when the exhaust gas includes large dust particles, and a prefilter is needed to remove such particles prior to this procedure. Because both of those procedures are expensive, economical equipment with high efficiency to remove SO2 should be devised in the near future.

3846 APTIC NUMBER 13185

Yoshioka, Naoya, Hitoshi Emi, Hideki Matsunura, and Masao Yasunami
FILTRATION OF AEROSOLS THROUGH THE FIBROUS PACKED BED. ON THE COLLECTION EFFICIENCY OVER THE WHOLE RANGE OF REYNOLDS NUMBER. (Seni jutenso ni yoru earozoru no roka - Zen Re su ryoiki ni okeru hoshu koritsu ni tsuite). Text in Japanese. Kagaku Kogaku (Tokyo), 33(4):381-386, April 1969. 14 refs.

To analyze the collection mechanisms of aerosols by fibrous packed beds, collection efficiency over the whole Reynolds (Re) number range was studied theoretically and experimentally. Mechanisms considered were inertia, diffusion, and interception. Approximate inertia-interception efficiencies at any Reynolds number were charted by computing results obtained at each specific Re number and the theoretical value at potential flow (Re = 1000). In laboratory experiments, homogeneous stearic acid particles with diameters of about 1 micron were produced by a Laner-Sinclair-type apparatus. Collection efficiency of a fiber by inertia, interception, and diffusion was considered as the summation of inertia-interception coefficients and semiempirical diffusion coefficients. The efficiency calculated in this manner explained experimental data very well. The paradox that collection efficiency is inversely proportional to interception parameters is explained by Re effects.

3847 APTIC NUMBER 13467

Young, Stewart W.
FUME DESTROYING PROCESS. (Thiogen Co., San Francisco, Calif.) U.S. Pat. 1,094,767. 3p., April 28, 1914. (Appl. August 15, 1911, 5 claims).

Decomposition or reduction of sulfur dioxide and formation of sulfur occur simultaneously when sulfurous fumes are subjected to the action of a heated carbonaceous fuel in the presence of a calcareous substance or solid reagent, or the action of a highly heated hydrocarbon fuel in the presence of a reagent. Fumes are then cooled to a temperature at which the sulfur will not recombine with oxygen. Decomposition is accelerated by the use of lime, lime rock, or any substance which has the property of neutralizing the sulfurous acid of the fumes.

3848 APTIC NUMBER 12528

Young, T. A. Jr.
GARY STEEL WORKS EXPERIENCE WITH DUST CONTROL AT NUMBER 3 SINTER PLANT. Blast Furnace Steel Plant, 56(12):1057-1063, Dec. 1968. 4 refs.

In a sintering plant, a well designed dust control system coupled with efficient collectors is necessary for industrial hygiene purposes, community relations, and protection of equipment. Before selecting a dust control system, the following should be considered: Type and size of dust, temperature of material or gas, efficiency, inplant and/or community problems, and government controls. In addition, it would be advisable to consult with experts and visit other plants making the same product and having related dust control facilities. Wet water sprays are most effective when the temperature of the material is above freezing and below 120 deg. F. Excess water solution causes clean-up problems because of carry back of fine material under the conveyor belt return idlers. Filter bag collectors are one of the most efficient type air cleaners. However, they should not be used if the humidity could exceed the dew point or if the air temperature exceeds 500 deg. F. Moisture creates buildup and seals the bags and ducts. Bag fabrics will not take temperatures over 500 deg. F. The possibility that "make-up" air may be needed for a large ventilating exhaust gas system should not be overlooked.##

3849 APTIC NUMBER 13934

Zacher, Jan
THE POSSIBILITIES OF ADAPTING THE PURIFYING EQUIPMENT FOR CRUDE GAS IN THE PRESSURE GASWORKS OF UZIN. (Moznosti upravy cisticiho zarizeni suroveho plynu v Tlakove plynarne Uzin). Text in Czech. Plyn (Prague), 49(4):229-233, 1969. 12 refs.

The possibilities are discussed for making technological adaptations of the present compressed gas purifying equipment for the partial selective removal of H2S and for the recovery of technically pure CO2. Both proposed methods depend on experiences already gained in long-term operation and experiments in controlling operational parameters. The choice of N-methylpyrrolidone as a washing-out agent in one of the suggested methods is determined by the consideration that it is possible to apply the suggested technological approach to other washing-out agents with similar characteristics. (Author summary modified)

3850 APTIC NUMBER 12571

Ahlquist, N. C. and R. J. Charlson
MEASUREMENT OF THE VERTICAL AND HORIZONTAL PROFILE OF AEROSOL CONCENTRATION IN URBAN AIR WITH THE INTEGRATING NEPHELOMETER. Environ. Sci. Technol., 2(5):363-366, May 1968. 4 refs.

The integrating nephelometer developed by the authors has been successfully adapted for rapid mobile monitoring of the atmospheric extinction coefficient due to scatter. The instrument has been used to measure horizontal profiles of a city as well as to make vertical soundings. The instrument, particularly the adaptation for a 1-second time constant, is described in detail. Horizontal profile data obtained with the instrument mounted on an automobile show that it may be possible to consider a city as an entity rather than a set of unconnected monitoring sites. Vertical sounding data are also presented showing considerable structure that should be of use to the meteorologist. (Author's Abstract)##

3851 APTIC NUMBER 12572

Allan, H. E., J. O. Pierce, and D. Yeager
DETERMINATION OF ZINC IN FOOD, URINE, AIR, AND DUST BY ATOMIC ADSORPTION. Am. Ind. Hyg. Assoc. J., 29(5):469-483, Sept.-Oct. 1968. 3 refs.

A procedure for the assay of zinc in biolcgical material and air samples by atomic absorption spectrophotometry is described. The use of different techniques for the preparation of samples is discussed, and the results are compared. The findings of zinc by atomic absorption spectrophotometry are compared with results obtained by the polarographic method. Representative findings are given for food, urine, hair, and dust removed from city air. (Author's Abstract)##

3852 APTIC NUMBER 13477

American Society for Testing and Materials
STANDARD METHODS OF LABORATORY SAMPLING AND ANALYSIS OF COAL AND COKE. In: 1966 Book of ASTM Standards, Part 19, Gaseous Fuels; Coal and Coke, No. D271-64, American Society for Testing and Materials, Philadelphia, Pa., 1964, p. 16-47. (18) refs.

Procedures for laboratory sampling and analysis of coal and coke are presented. For determining the moisture of coal, an oven which has a uniform temperature in all parts and a minimum of air space should be used. For determining the moisture of coke, a drying oven with openings for natural air circulation may be used. Sulfur is determined in the washings from the oxygen-bomb calorimeter followin calorimetric determination. The determination of carbon and hydroge is made by burning a weighed quantity of sample in a closed system and placing the products of combustion in an absorption train after complete oxidation and purification from interfering substances. This method gives the total % of carbon and hydrogen in the coal as analyzed, and includes the carbon in carbonates and the hydrogen in the moisture and the water of hydration of silicates. In the determination of nitrogen, it is converted into ammonium salts. These salts are decomposed in a hot alkaline solution from which the ammonia is recovered by distillation and determined by alkalimetric or acidimetric titration. There is no direct method of determining oxygen. It is calculated by subtracting from 100 to % of hydrogen, carbon, sulfur, nitrogen, moisture, and ash. Methods of preparing the laboratory samples for analysis are also presented.

3853 APTIC NUMBER 12573

Arnikar, H. J., T. S. Rao, and K. H. Karsarkar
ELECTRODELESS DISCHARGE AS DETECTOR IN GAS CHROMATOGRAPHY. IV. COMPARISON WITH A THERMAL CONDUCTIVITY DETECTOR. J. Chromatog., 38(1):126-129, Nov. 5, 1968.

A comparison has been made between the efficiency of an electrodeless discharge detector and a thermal conductivity detector in gas chromatography. Under the same conditions the signals from the former are much stronger, indeed with no amplification the signal often represents only a fraction of the total output which is too high for the recorder. The sensitivity of the electrodeless discharge detector is not adversely affected by increasing temperature. The high sensitivity and versatility of the detector combined with the extreme simplicity of its construction commend it for use as a cheap and efficient detector in gas chromatography.##

3854 APTIC NUMBER 13031

Bailey, Robert L.
CONTROL ATMOSPHERE FOR GAS SAMPLING APPARATUS. (National Distillers and Chemical Corp. New York, N.Y.) U.S. Pat. 3,449,958. 4p., June 17, 1969. 2 refs. (Appl. Apr. 25, 1966, 3 claims).

A basic atmospheric sampler comprises an apparatus having an inlet through which atmosphere is withdrawn from a container, the inlet of the sampler being movable between a first position at which the atmosphere is removed from the container and a second position where the inlet of the sampler is clear of atmosphere from within the container. The sampler can include any type of detection cell or device for monitoring the quality or nature of the atmosphere sample. The present invention adds to this basic combination a source of control atmosphere and a device to insure that the control atmosphere is directed to the inlet of the sampler when the sample inlet is in its second position, clear of atmosphere within the container. The use of the control atmosphere provides a known atmospheric reference for balancing and otherwise calibrating the detection cell and associated equipment. It also assists in purging the sampler and associated atmosphere testing devices between successive tests, so that the devices can be recycled and used effectively to test the atmosphere from within successive containers.

Preceding page blank

3855 APTIC NUMBER 13039

Rasenberger, W.L. and D.F. Adams
IMPROVEMENTS IN THE COLLECTION OF HYDROGEN SULFIDE IN CADMIUM HYDROXIDE SUSPENSION. Environ. Sci. Technol., 3(3):258-261, March 1969. 11 refs.

The technique of collecting hydrogen sulfide at ambient air concentrations in cadmium hydroxide suspension, in use for more than 10 years, is reported to prevent loss from sulfide oxidation. A comparison was made of this procedure with bromine microcoulometric titration and with calculations of the anticipated hydrogen sulfide concentrations produced in a laboratory gas dilution system. An unpredictable and non-reproducible loss of hydrogen sulfide, as high as 80% during collection of a 2-hr impinger sample containing cadmium hydroxide suspension, occurred. Evidence of the photodecomposition of cadmium sulfide in the impinger and techniques to reduce loss of sulfide during sampling and storage are presented. The suggested modification provides reproducible hydrogen sulfide recoveries. Reliable quantitative results were obtained. (Author abstract modified)

3856 APTIC NUMBER 12956

Bennett, Elmer T.
ATMOSPHERE ANALYSIS DEVICE. (Assignee not given.) U. S. Pat. 3,447,907. 3p., June 3, 1969. 3 refs. (Appl. Oct. 10, 1966, 8 claims).

Previously, atmospheric SO2 has been measured by the lead peroxide cylinder method. Reactivity has been defined as the weight of sulfate collected by a unit area of lead peroxide surface in a unit time, divided by the concentration of sulfur dioxide in the air. Test results with the present invention have indicated that the reactivity rates previously disclosed are inaccurate by 15 to 50%. The present invention is based on the premise that reactivity increases with relative humidity. The invention includes means designed to maintain a substantially uniform relative humidity for the lead peroxide. This is accomplished by utilizing the capillary action of a wick, with the wick having one end immersed in water and the other end juxtaposed to the layer of lead peroxide. A housing adapted to contain a liquid supports a hollow cylindrical, perforated wall. The wick runs along the inner surface of the wall and contacts the liquid in the housing. A layer of absorbent material is coupled to the outer periphery of the wall and is kept moist by the wick.

3857 APTIC NUMBER 13028

Bernert, Jurgen
A METHOD FOR DETERMINATION OF THE TOTAL AMOUNT OF COMBUSTIBLE ORGANIC SUBSTANCES IN WASTE GASES WITH HIGH WATER VAPOR CONTENT. (Eine Methode zur Bestimmung der Gesamtmenge verbrennbarer organischer Substanzen in Abgasen mit hohen Wasserdampfgehalten). Text in German. Wasser Luft Betrieb, 13(6):215-216, June 1969. 5 refs.

The method for determination of the total amount of combustible organic substances in waste gases described in two previous papers by J. Bernert and H. Engelfeld becomes inaccurate in cases when the waste gases have a high moisture content or are even saturated with water vapor. This drawback is corrected by a new sampling aspirator in which the waste-gas sample is cooled to remove the moisture by condensation. In this manner, the sample is separated into an aqueous phase and a gaseous phase. The determination of the total C concentration in the latter can now be carried out with high precision by the original method, while the composition of the condensate can be determined in several different ways. The method of Egli-Shar, which involves the determination of dissolved organically bound carbon in waste water, is believed to be best suited for this type of investigation.

3858 APTIC NUMBER 13932

Bethell, H. D., J. T. Shaw, and A. C. Thomas
AN IMPROVED FORM OF SOLID OXIDISER FOR THE CONVERSION OF NITRIC OXIDE TO NITROGEN DIOXIDE IN A FLOW SYSTEM. Chem. Ind. (London), no. 3:91, Jan. 20, 1968. 2 refs.

The oxidizer for accurate NO measurement is prepared by immersing a quantity of glass wool in a bath containing 15 g of K2Cr2O7 and 15 g of 98% H2SO4 made up to 100 ml with distilled H2O. After soaking, the glass wool is removed and excess solution is allowed to drain off. The impregnated glass wool is dried in an air oven at 65 C until the color has changed from orange to dark red. Eighteen hours suffices for a 30 g sample. After drying, the material is placed in a constant temperature box in a water bath at 25 C for a half hour. Tests with NO concentrations up to 100 ppm and flow rates of 140 ml/min showed conversions to the dioxide in excess of 97% for at least 90 min, and above 95% for 3 hrs.

3859 APTIC NUMBER 12577

Bokowski, D. L.
RAPID DETERMINATION OF BERYLLIUM BY A DIRECT-READING ATOMIC ABSORPTION SPECTROPHOTOMETER. Am. Ind. Hyg. Assoc. J., 29(5):474-481, Sept.-Oct. 1968. 12 Refs.

A sensitive and specific analytical method for beryllium in air, swipe, biological and packing material samples was developed. A single-beam atomic absorption spectrophotometer and high-temperature nitrous oxide-acetylene flame is used. The chemical technique for sensitivity enhancement and decontamination from radionuclides is described. Maximum time expenditure for an analysis is less than 30 minutes. Multiple samples may be run in the same time period. Sensitivity of the method is less than 0.04 parts per million of beryllium with a repeatability of approximately 2% of the amount present. Decontamination factors for uranium and transuranium elements were greater than 5000. (Author's Abstract)##

3860 APTIC NUMBER 13056

Bourbon, P. and J. Alary
DETERMINATION OF FLUORIDE POLLUTION BY A RAPID TECHNIQUE UTILIZING PAPER IMPREGNATED WITH SODA. (Evaluation de la pollution fluoree par une technique rapide utilisant des papiers impregnes de soude). Text in French. Bull. INSERM, 24(1):23-30, Jan.-Feb. 1969.

Previously, Whatman paper impregnated with lime had been used to determine fluoride pollution in an aluminum factory. The same technique using paper impregnated with a 1 N solution of soda gave better recovery of fluoride than lime paper in tests made in six locations over a period of six months. After exposure, the papers were lacertated and extracted with water. Fluoride was determined colorimetrically either directly on an aliquot of the washings, or after distillation to minimize interfering impurities. Although the distillation method gave slightly better results, the direct method was simpler and more applicable to industrial usage.

3861 APTIC NUMBER 12579

Bovee, H. H. and P. A. Breysse
STUDY OF AIR QUALITY AND CONTAMINANT ANALYSIS FOR WORK UNDER COMPRESSED AIR. Am. Ind. Hyg. Assoc. J., 29(5):432-438, Sept.-Oct. 1968. 6 refs.

The quality of air in a tunnel being constructed under pressures varying from 0 to 30 psig was monitored for a period of 24 months. Except for an electrical fire and an oxygen deficiency incident, the tunneling was completed without hazardous levels of air contaminants being encountered. The compressor facilities and sampling and analytical procedures are described. (Authors' abstract) ##

3862 APTIC NUMBER 13810

Brink, Joseph A., Jr. and J. David Porthouse
EFFICIENT DUST CONTROL VIA NEW SAMPLING TECHNIQUE. Chem. Eng., 76(5):106-110, March 10, 1969. 6 refs.

Conventional approaches to sampling process gas for particulate impurities assume that the sample will be a small percentage of the total gas stream. Because dust loading and particle-size distribution vary with changes in process conditions, as well as from point to point in a process duct or stack, many samples are required to obtain representative data. A portable dust sampler capable of handling the entire process gas stream has been developed. The sample obtained is truly representative and isokinetic procedures or multipoint traverses are not required. The 'total' sampler includes a high-volume vacuum cleaner comprising a drum, bag filter, and blower; manometers for measuring the internal gas pressure of the process vessel and pressure drops across the bag filter and orifice meter; and the orifice meter for monitoring air flow. When a total sample is taken, the air flow rate through the sampling equipment equals the air flow from the process equipment. By metering the sample air flow rate, the draft on the process equipment is automatically determined. A test program with the total sampler indicated that plant dust contained an appreciable amount of fine particles, and a bag-type collector was installed. This unit removes 99% of the dust reaching it. In contrast, a cyclone type collector would have collected only 59.6% of the dust reaching it.

3863 APTIC NUMBER 12946

Brown, Paul M.
A MODIFICATION OF THE BAUSCH AND LOMB AEROSOL DUST COUNTING SYSTEM TO AUTOMATICALLY MEASURE AEROSOL SIZE DISTRIBUTIONS. Environ. Sci. Technol., 3(8):768-769, Aug. 1969.

The Bausch and Lomb Dust Counting System was modified to allow unattended, automatic measurements from which size distribution of airborne particles can be determined. The system comprises the Dust Counter 40-1, Printer, and Digital Readout. On front of the Dust Counter is a size selector switch which may be set at one of several size ranges, and only particles equal to or larger than the range selected will be detected and counted. A simple, inexpensive circuit is described which can carry out the switching function automatically and continuously. The modified system has been successfully operated as a ground based system and has been flown to altitudes up to 20,000 feet MSL. Sampling times of 100 seconds were used, but additional changes in the circuity to alter the sampling times can be made to suit particular needs.

3864 APTIC NUMBER 13050

Budzak, Paul M.
SAFETY AND VENTILATION. Mining Engineering, 21(2):110-111, Feb. 1969.

Coal mine gas explosions may be due to an accumulation of undetected methane, a flammable gaseous hydrocarbon. A new methane monitoring system is being developed and tested by industrial and government agencies. This system is designed as an integral part of permissible face equipment and would automatically cut off power to the mining machines when the percentage of methane reached a concentration of 2% or more for a period of 3 sec. The monitor's electrical system is completely isolated from the mine's power circuit, and the warning lights of the monitor are visible to everyone in the vicinity of the unit. The monitor offers greater protection from methane gas liberated from the coal seam.

3865 APTIC NUMBER 12570

Cares, Janet W.
THE QUANTITATIVE DETERMINATION OF AIRBORNE METALLIC DUSTS AND FUMES BY X-RAY SPECTROMETRY. Am. Ind. Hyg. Assoc. J., 29(5):463-468, Sept.-Oct. 1968. 6 refs.

Metallic dusts and fumes in air may be collected on filter paper and determined quantitatively by measurement of characteristic secondary x-rays produced by irradiation with high-voltage x-rays. Results are obtained rapidly and simply with little or no sample preparation and without sample destruction. A method is presented for preparation of reference standards, and x-ray characteristics of various types of filter media are discussed. A study of potential interferences is presented as well as results obtained in field sampling. (Author's Abstract)##

3866 APTIC NUMBER 13161

Castello, G. and S. Munari
ANALYSIS OF GASEOUS AIR POLLUTANTS BY MEANS OF GAS CHROMATOGRAPHY WITH HELIUM DETECTOR. (Analisi di inquinanti atmosferici gassosi per via gascromatografica con rivelatore a elio metastabile). Text in Italian. Chim. Ind. (Milan), 51(5): 469-475, 1969. 17 refs.

Among the methods for testing air pollution, gas chromatography versatile, rapid, and disposed to automation. However, this system does not allow the simultaneous measurement of different substances. Furthermore, it gives average values and requires a period of time inversely proportional to the concentration of a given product in the gas to be analyzed. These problems may be solved by using such sensitive devices as the electron capture detector (ECD) and the helium detector. By employing the helium detector, it is possible to evaluate very low concentrations of numerous gaseous pollutants. This method is quick, works with small samples, and is also able to measure the concentrations of two different substances simultaneously.

3867 APTIC NUMBER 13805

Chaigneau, M., L. Giry, and L. P. Ricard
ANALYTICAL INVESTIGATION OF SOME TYPES OF SOOT, USING MASS SPECTROMETRY. (Etude analytique de quelques suies par spectrometrie de masse). Text in French. Chim. Anal. (Paris), 51(4):197-195, April 1969. 9 refs.

Application of mass spectrometry to soot obtained from the combustion of fuel in a boiler furnace, from the combustion of motor fuel, and from chimney deposits caused by the burning of firewood revealed that carbonaceous deposits comprise complex mixtures containing numerous organic substances. Of the 74 organic bodies identified, 34 were hydrocarbons and these included a number of condensed-nucleus polycyclic compounds and aromatic hydrocarbons. Among the main compounds were derivatives of naphthalene, pyrene, perylene, acenaphthalene, and diphenyl. Other compounds identified were acridines, phenols, and quinones. The data obtained show that the composition of soot varies according to the origin of the fuel and the method of combustion. Soot from wood contains more hydrocarbons than soot from fuel oils or even motor fuels, but soot from fuel oil contains only hydrocarbons. Quinones, phenols and their ethers, acetic acid, and benzaldehyde are found only in soot from wood.

3868 APTIC NUMBER 12943

Chow, Tsaihwa J., John L. Earl, and Carrie F. Bennett
LEAD AEROSOLS IN MARINE ATMOSPHERE. Environ. Sci. Technol., 3(8):737-740, Aug. 1969. 11 refs.

Procedures for the shipboard sampling of marine air and the analysis of its lead content by the isotope dilution method are discussed. Marine air collected over the north and central Pacific Ocean between California, Midway Island, and American Samoa showed a lead concentration range of 0.0003 to 0.0015 micro g/cu m. This lead concentration range shows that marine air is the least polluted of the north temperate atmospheres. Because of the difficulty in evaluating the individual random sampling contamination due to the ship's exhaust plume, the marine air samples were treated as a suite to determine their representative lead aerosol concentrations. A lead blank of 0.08 micro g was subtracted from each sample and observed lead concentration in each filter was plotted against the volume of air filtered to obtain the sample.

3869 APTIC NUMBER 13661

Critchlow, A. and B. A. Maguire
AIRBORNE DUST IN MAN'S ENVIRONMENT. Environ. Eng., no. 35:12-20, Nov. 1968. 130 refs.

Of the large numbers of particles less than five micrometers contained in the lower atmosphere, only a small proportion are due to man-made pollution. The majority are derived from the incessant interactions between the air and the earth's surface, and are more or less permanently airborne. Natural and artificial deposits of larger particles can be temporarily airborne; the hazards arising from these particles are equally important. The most serious effect of airborne dust on man is the damage inflicted on the respiratory tract. If the dust is insoluble and a man continues to work or live in an artificially high concentration, dust accumulates in the lungs to bring about one of several types of pneumoconiosis. Apart from the health hazard due to dust, dust clouds of combustible materials, or readily oxidized noncombustible materials, can produce violent explosions. The concentration and average size of dust involved in an explosion are usually much larger than the 'respirable' dust particles. To estimate the hazards presented by an airborne dust cloud, a wide variety of dust-sampling instruments have been developed. They may be classified in three categories according to whether number, area, or mass concentration is measured, with each category subdivided into 'direct' and 'indirect' instruments. Provided their limitations are realized, these automatic instruments have valuable applications. There is a need to create a controlled airborne dust environment in the laboratory for the testing of equipment and instruments. Threshold limit values, established for dusts encountered in industrial processes, should be used only as guides in controlling the dust environment. They should not be regarded as fine limits between safe and dangerous concentrations. A representative list of dust research organizations studying airborne dust is included.

3870 APTIC NUMBER 13388

Dahl, J. B.
METHOD FOR DETERMINING TRACE MATERIALS. (Bruk av sporstoffer). Text in Norwegian. Tidsskr. Kjemi, Bergv. Met., 28(5):109-111, May 1968. 3 refs.

A simple inactive tracer method was developed for the study of the field distribution of gaseous air contaminants emitted from factory stacks and other sources. Indium oxide particles were used, with diameters in the region of 0.01 to 0.1 micron as tracer gas. The particles were formed by combustion of an alcoholic solution of indium nitrate in an ordinary oil burner. Samples of the tracer gas, mixed with the stack gas to be studied, were collected in small plastic trays filled with water. The contents of indium in the samples were determined by neutron activation analysis. The method, which is very sensitive and selective, is useful for studying the distribution of gases emitted from a particular stack or for the determination of the gas emission from planned stacks. (Author summary modified)

3871 APTIC NUMBER 13863

Dmitriev, M. T. and M. A. Kitrosky
GAS CHROMATOGRAPHIC DETERMINATION OF CARBONYL COMPOUNDS IN THE AIR. (Gazokhromatograficheskoye opredeleniye karbonil 'nykh soyedinenij v vozdykhe). Text in Russian. Zh. Analit. Khim. (Moscow), 23(7):1079-1081, July 1968. 2 refs.

Acrolein and acetone interfere with each other on short columns. Formaldehyde has a negligible ionization effectiveness in a flame-ionization detector, and carbonyl groups cannot be ionized in a hydrogen flame. With a Khrom-1 gas chromatographic apparatus, it is possible to determine 0.05 mg/cu m of carbonyl compounds in the air from C2 to C7. The sensitivity of determinations obtained experimentally is in satisfactory agreement with theoretical values. The relationship between the retention volume, boiling temperature of the compound, and column temperature was established for aldehydes and ketones. (Author abstract modified)

3872 APTIC NUMBER 13396

Drager, Otto Heinrich
METHOD AND APPARATUS FOR THE SIMULTANEOUS SELECTIVE DETERMINATION OF HYDROGEN SULPHIDE AND A MERCAPTAN IN A GAS MIXTURE. (Draegerwerke, Heinr. und Bernh.), Brit. Pat. 1,092,006. 4p., Nov. 22, 1967. (Appl. June 1, 1966, 6 claims.)

A method for the simultaneous selective determination of H2S and a mercaptan in a gas mixture is presented. A glass tube filled with a layer of a Pb salt precipitated on silica gel followed by a layer of a Cu and/or an Hg salt precipitated on silica gel serves as the indicator. The Pb layer turns progressively brown when exposed to H2S, the length of the colored section serving to indicate H2S concentration. The Cu or Hg layer serves to indicate the presence of a mercaptan. Coloring of this layer is only slight, and provision is made for wetting it with a color-intensifying agent, S dissolved in benzene or its homologues. Operating range for both indicators is 10 to 100 ppm. Methods of preparing both layers are presented.

3873 APTIC NUMBER 12668

R. H. Forsey
A DUAL-COLUMN GAS CHROMATOGRAPHIC METHOD FOR THE ANLAYSIS OF LIGHT GASES. J. Gas Chromatog., 6(11):555-556, Nov. 1968

Although many separation methods for H2, N2, O2, CO2, CO, CH4, C2H6, and H2O mixtures using gas chromatography have been described in the literature, all have had certain limitations. A system which combines a molecular sieve and a polyaromatic polymer-bead column has the advantage of eluting O2 before N2 and resolving CO2 and H2O, all at ambient or higher temperatures. The column temperature was programmed at 12 degrees C/min. from 30 degrees to 150 degrees C after the CO emerged from the molecular sieve column to speed the elution of water and higher molecular weight hydrocarbons from the polyaromatic polymer-bead column. Higher molecular weight hydrocarbons, amines, chlorinated and nitrated hydrocarbons may be analyzed by this method because the column can be programmed as high in temperature as 290 degrees C to speed the elution of these compounds.##

3874 APTIC NUMBER 13038

Forwerg, Walter and Peter Dopfer
DETERMINATION OF CHLORINE EMISSIONS. (Bestimmung von Chloremissionen). Text in German. Wasser Luft Betrieb, 13(3):92-93, March 1969. 4 refs.

Description and flow diagram are presented for the 'Mikrometer' recording photometer for monitoring chlorine emission. The air sample is drawn into a reaction helix in which it contacts the reaction solution containing methyl orange, potassium bromide, hydrogen peroxide, and glycol. Any chlorine present in the air sample bleaches the methyl orange, while the potassium bromide accelerates this reaction and the hydrogen peroxide oxidizes any SO2 present in the air sample, thus completely eliminating any cross-sensitivity of the process to SO2. Following removal of the gas phase in a separator, the reaction solution is analyzed by an alternating-light photometer which continuously measures the extinction of the reaction solution. With a given rate of sample-air flow, the strength of the extinction is a measure of the Cl2 concentration. The measured value is amplified and transmitted to a recording device. The gas leaving the separator is used to propel the spent reaction solution into a storage tank. Details of the apparatus design, the dosage of the chemicals in the reaction solution, the measurement procedure, the calibration of the air-sampling device and of the optical and electrical subsystems, as well as the selectivity, reproducibility and sensitivity of the measuring process are specified.

3875 APTIC NUMBER 12669

E. R. Frederick
THE "AFC" STATIC GENERATOR AND EVALUATOR. Am. Dyestuff Reptr., 57(15):31-33, July 15, 1968. 3 refs.

A controlled triboelectrification process with appropriate instrumentation is described for estimating the electrostatic properties of fabrics and other materials. This equipment, referred to as The "AFC" Static Generator and Evaluator, provides a rapid and reproducible means for delineating static properties in terms of relative charge, polarity, intensity, and discharge rate. (Author's Abstract)##

3876 APTIC NUMBER 12453

Gruner, Pavel
EXPERIMENTAL INVESTIGATIONS ON THE RELATIONSHIP BETWEEN THE SEPARATION EFFICIENCY OF A NONCLOGGING FIBER FILTER AND ITS POROSITY. Staub (English translation), 28(9):6-10, Sept. 1968. 11 refs.

The relationship between separation efficiency and porosity of a filter layer formed from polyester fibre has been investigated with the help of pigment aerosols. To avoid clogging of the filter the tests have been carried out at a temperature at which decomposition of particles in the filaments occurs. In addition, filtration constants have been derived which permit a simple calculation of separation efficiency of the filter layer to be carried out for different porosities and for an individual filament. A comparison has been made between the experimental results and theoretical values.

3877 APTIC NUMBER 13087

Gupta, S. K. and P. K. Bandyopadhyay
NITROUS GASES-A HAZARD IN MINES AND INDUSTRIES. J. Mines Metals Fuels, 17(2):50-52, Feb. 1969. 8 refs.

The highly toxic nature of nitrogen oxides demands periodic checks on the gases in working places where they are likely to occur. Underground mines, defense installations, and many chemical factories and industrial shops are important sources of nitrous fumes. Oxides of nitrogen are produced in mines by shot firing and diesel engines. Incomplete detonation or burning of nitroglycerine explosives may produce N oxides in considerable quantities. Explosives with improper oxygen balance can produce these gases on detonation. The exhaust gases from diesel engines contain NO2, N2O4, and NO in addition to CO, SO2, and SO3. Concentrations of N oxides and CO must be lower than 1000 and 2000 ppm, respectively, in exhaust gas emissions for underground vehicles. Attention should be given to the acidic nature and solubility of N oxides in collecting gas samples. Samples collected in moist or soft glass bottles by air displacement are seldom representative. Two practical pieces of gas-sampling equipment are described. A widely used test to detect the presence of N oxides employs starch-iodide papers which turn blue on exposure to nitrous fumes. Sulfur oxides interfere with this test, as they too liberate iodine from potassium iodide. Three colorimetric methods of N oxide determination are reviewed. Recommended first aid measures for people suspected of inhaling nitrous fumes are listed.

3878 APTIC NUMBER 13419

Hahn, Kwang J., Dean J. Tuma, and John L. Sullivan
RAPID AND SIMPLE CONTINUOUS RADIOCHEMICAL SEPARATION OF COPPER, MAGNESIUM, ZINC, AND MANGANESE IN BIOLOGICAL MATERIALS. Anal. Chem., 40(6):974-976, May 1968. 17 refs.

Microanalytic techniques for certain trace metals, and isotopes, including Cu64, Mg27, Zn69, and Mn56, were studied to overcome major difficulties due to the unaccounted-for nuclides present. Determination of these elements by activation analysis was made practical by the devised method even though the half-life of Mg27 is short, and the principal photopeak is practically superimposed on Mn56. A modified procedure of Cholak, using dithizone, was introduced to extract copper from HCl solution. Zinc was removed from the remaining aqueous layer of the copper extraction using a removed from the remaining aqueous layer of the copper extraction using a modified procedure of Fischer and Leopoldi. The resulting solution was washed, neutralized, and buffered with pH 6.1 acetate buffer. Manganese was extracted after addition of sodium diethyldithiocarbamate and chloroform. Magnesium was removed from the remaining aqueous phase after adjustment to pH 9.0. An optional procedure was given for isolation of magnesium only.

3879 APTIC NUMBER 13143

Henley, Don E., William H. Glaze, and J. E. G. Silvey
ISOLATION AND IDENTIFICATION OF AN ODOR COMPOUND PRODUCED BY A SELECTED AQUATIC ACTINOMYCETE. Environ. Sci. Technol., 3(3): 268-271, March 1969. 23 refs.

Actinomycetes have been reported to turn river water a brownish color and to release a musty odor. A method is presented for obtaining pure samples of materials which are reported to cause odors from actinomycetes cultures, and the structural elucidation of one of the components is described. A Streptomyces cinnamoneus strain was grown in culture media, and the odor-laden gas produced was collected and removed from the culture to a trap containing dichloromethane at -10 C. Gas-liquid chromatography revealed the presence of several compounds in the effluent gas. Spectroscopic properties of one major component suggested the structure of 5-methyl-3-heptanone, which was confirmed by comparison with standard reference spectra.

3880 APTIC NUMBER 13070

Hini, Yasuji and Fumio Muramatsu
SAMPLING METHOD FOR DETERMINATION OF NITROGEN OXIDES IN FLUE GAS. (Endo-haigasu chu no chisso-sankabutsu bunseki yo shiryo-gasu saisyu-ho no kento). Text in Japanese. Bunseki Kagaku (Japan Analyst, Tokyo), 18(6):710-716, 1969. 6 refs.

The concentrations of nitrogen oxides in exhaust gas emitted from oil-fired boilers were measured by using three kinds of gas sampling apparatus, and the sampling method for their determination in flue gas was examined. The values of nitrogen oxides by the gas sampling apparatus prescribed in JIS K 0104 agreed well with those by direct gas sampling through capillary tube and by a bottle containing 22% sodium chloride solution as the trapping liquid. The concentration of nitrogen oxides was invariable at any sampling point in the same section of flue. The bubbler containing 0.1 N sodium hydroxide solution used for the determination of nitrogen dioxide in flue gas had high absorbing efficiency for carbon dioxide, and the volume of gas must be corrected for this influence by titration of carbonate ion in the absorbing solution after sampling. (Author abstract modified.)

3881 APTIC NUMBER 12455

Hofmann, Klaus Peter and Volker Mohnen
THE OPERATION OF THE ACOUSTIC PARTICLE COUNTER. Staub (English translation), 28(9):15-20, Sept. 1968.

The Langer instrument for counting suspended particles with diameters above 10 microns is gaining increasing importance. Due to its simplicity and low sensitivity to disturbing effects this method proved particularly suitable to the counting of ice nuclei. A wide field is also open to the Langer counter in the monitoring of dust-free rooms, where it is necessary to continuously and individually control all critical points with minimum effort and with no lower limit for the particle concentration. It was therefore thought desirable to investigate the theoretical foundations of the Langer counter and explain its operation.

3882 APTIC NUMBER 12671

B. Holma
FIXED DETECTOR SYSTEM. AN EXTERNAL METHOD FOR STUDYING THE INITIAL COURSE OF LUNG CLEARANCE IN EXPERIMENTAL ANIMALS. Arch. Environ. Health, 17(6):866-870, Dec. 1968. 3 refs.

The validity of a fixed detector system to study the initial course of lung clearance of radioactively tagged particles in rabbits is investigated. The detector system is built of two opposed rectangular open-ended lead collimators in the same plane, each with a scintillation detector, placed bilaterally against the thorax of the rabbits. (Author's abstract)##

3883 APTIC NUMBER 12456

Horn, Wilhelm
PROCESS FOR CONTINUOUS GRAVIMETRIC DETERMINATION OF THE CONCENTRATION OF DUSTLIKE EMISSIONS. Staub (English translation), 28(9):20-25, Sept. 1968. 13 refs.

An indirect continuous measuring method for gravimetric determination of dust concentration has been developed which is independant of particle structure. It is based on the absorption of radioactive rays depending on the surface mass. The separation and concentration of aerosols are carried out in a specially designed electroprecipitator. Rays of radioactive isotopeC-14 penetrate the collecting electrode, which is moving continuously, together with the specimen to be measured. The sensitivity of measurements can be varied within a wide range by selecting emitter activity and measuring time constants.

3884 APTIC NUMBER 13200

Jentzsch, Dietrich and Klaus Kuhne
FLAME IONIZATION DETECTOR. (Bodenseewerk Perkin-Elmer & Co., GmbH, Uberlingen, Germany) U. S. Pat. 3,455,657. 5p., July 15, 1969. 3 refs. (Appl. June 9, 1966, 10 claims).

The invention relates to an improved flame ionization detector whose dimensions are reduced but whose linearity is maintained. The detector includes a burner nozzle supported and electrically insulated from a detector base plate and an electrically conductive air pipe with an air converging nozzle located within the pipe. An electrically conductive coupling is provided between the burner nozzle and the air pipe, which is positioned so that the burner nozzle extends slightly through the air converging nozzle. By this means the flow of air is concentrated at the flame and improved combustion and reduced air consumption are accomplished. The sensitivity of the detector is increased, since the air pipe chamber shields the flame from interfering influences. The coupling provides firm contact between the pipe and burner nozzle at high temperatures and is adapted for facilitating maintenance of the burner nozzle.

3885 APTIC NUMBER 13183

Jungreis, Ervin and Zili Anavi
DETERMINATION OF SULPHITE ION (OR SULPHUR DIOXIDE) BY ATOMIC ABSORPTION SPECTROSCOPY. Anal. Chim. Acta, 45(1):190-192, March 1969. 8 refs.

The indirect determination of sulfite ion (or sulfur dioxide) by the atomic absorption technique is based on the very high stability of the $(Hg(SO3)2)2$ complex. Addition of sulfite ions to a mercury (II) oxide suspension causes the transference of mercury from the solid state to the soluble complex. This produces a proportional increase of atomic absorption of the mercury in the supernatant fluid, indicative of the sulfite content. The analysis is carried out in a buffer solution of pH 11. A Perkin-Elmer Model 303 atomic absorption

spectrophotometer with a mercury hollow-cathode lamp and a three-slot burner is used for measurements. The influence of the reaction system of ammonia, sulfate, nitrite, thiosulfate, bromide, iodide, thiocyanate, and cyanide were measured. Of these compounds, iodide, thiosulfate, and thiocyanate behaved similarly to sulfite ion, whereas the remainder had no influence. The method of analysis described may be applied to studies of air pollution. Sulfur dioxide is conveniently absorbed in alkaline impingers, and the proposed determination is also carried out in an alkaline medium.

3886 APTIC NUMBER 13218

Jungreis, E. and Philip W. West
SPECIFIC MICRODETERMINATION OF VANADIUM(V) ON THE RING OVEN. Anal. Chim. Acta, 44:440-442, 1969. 2 refs.

A new highly selective compound for the easy detection of vanadic acid is a Schiff base reagent formed from the condensation of anthranilic acid with salicylaldehyde. Filter paper was impregnated with a drop of the reagent solution and placed on a ring oven at 45-50 deg. The sample solution was then added to the reagent spot and dried. The resulting reaction product was washed out with chloroform to the ring zone, after which the paper was exposed to steam to wash out any color due to the reagent itself. The gray-yellow ring of a positive vanadate reaction was then matched against standard rings. Three rings made from different numbers of microliter drops of a standard solution are sufficient for each unknown. The sum of the numbers of microliter drops of the standard was divided by the sum of the numbers of microliter drops of the three rings made from the unknown solution referred to the standard solution. When this quotient was multiplied by the concentration of the standard solution, the concentration of the unknown sample was obtained. The reagent does not appear to be affected by foreign ions, so the method is considered essentially specific. The lower limit for the determination of vanadium is 0.1 microgram; the upper limit for accurate estimation is 3 micrograms.

3887 APTIC NUMBER 12673

J. P. Keane, F. E. R. Fisher
ANALYSIS OF TRACE ELEMENTS IN AIR-BORNE PARTICULATES, BY NEUTRON ACTIVATION AND GAMMA-RAY SPECTROMETRY. Atmos. Environ., 2(6):603-614, Nov. 1968.

Neutron activation provides a direct method for the analysis of trace elements in airborne particulate material collected on filters. By means of gamma-ray spectrometry and utilizing computer techniques the elements sodium, manganese, chlorine, vanadium, aluminum, bromine, and possibly copper and indium may be determined simultaneously. A number of filter materials have been analysed for interfering trace elements. Teflon filters are found to have particularly low Cl2 concentration in comparison with other materials examined. The esparto grass filters currently used at the nuclear weapon fallout sampling stations operated by A.E.R.E. Harwell, have high trace impurity concentrations. Nevertheless the volume of air filtered is so large that it was found possible to carry out a series of measurements using samples from these stations. Weekly samples from Chilton (Berks.), Lerwick (Shetland), and Milford Haven (Pembs.) have been collected and analysed over periods of several months. Mean concentrations (micro g/3) at Chilton for the year April 1965 to March 1966 were Cl2 2.2, Mn 0.033, Na 0.85, Al 0.25, Ar 0.040, and V 0.015. A small number of daily samples from Salford (Lancs.) indicate concentrations 2-10 times higher than those from Chilton. (Author's Abstract)##

3888 APTIC NUMBER 13925

Kitson, G. H. J. and T. J. F. Haven
PHOTOELECTRIC READINGS. THEIR SIGNIFICANCE FOR DUST CONTROL ON COLLIERIES. J. S. African Inst. Mining Met., 69(3):130-138, Oct. 1968. 16 refs.

The reference instrument used for routine airborne dust sampling in South African collieries in the modified thermal precipitator. The results of the samples are quoted in units called P. E. R. (photoelectric readings). These P. E. R. units provide a comparative measure of the surface area of the respirable dust. Sampling programs are completed and analyzed on a yearly basis. They are not intended to measure the dust exposure of personnel but to determine the improvement or deterioration in dust conditions underground and in surface plants. Since P. E. R. units are relatively new units of dust measurement, little is known of their absolute values compared with well-known units used internationally to express dust concentrations. With dusts of varying size distribution, there will be no fixed relationship between surface area and numerical and gravimetric concentrations. However, to indicate a very rough guide as to the absolute value of a P. E. R., three theoretical studies are included in this paper. An important factor arising out of the investigation is that this particular sampling procedure, together with the cooperation of the managers, appears to have been responsible for a significant reduction in airborne dust on the collieries. The long-term trends for the industry as a whole indicate a significant improvement for all but one main mining operation in the underground workings and for all the operations carried out in the surface plants since the establishment of the Collieries Dust and Ventilation Laboratories in 1956. (Author summary modified)

3889 APTIC NUMBER 13367

Kniebes, Duane V., J. Adrian Chisholm, and Robert C. Stubbs
DIRECT ODOR LEVEL MEASUREMENT INSTRUMENTATION. Gas Age, 136(8): 24-27, Aug. 1969. 4 refs.

Odor thresholds of natural gas are conventionally measured by personnel who sniff gas-air mixtures, different operators

obtaining somewhat different results due to normal variations in olfactory sensitivity. These variations are eliminated by the use of the Odotron, a new portable instrument which directly measures sulfur compounds in natural gas and provides for the translation of this measurement into the odor intensity of the gas. Although the instrument represents advanced technology, it is expected to perform well in the field because of well-tested, commercially available components. These include a gas sampling valve and liquid injection port, a chromatographic column contained in a temperature-controlled oven, and a flame photometric detector with photomultiplier and amplifier circuits. The instrument has not as yet been subjected to extensive field tests. Thus, it has not been possible to test the method for translation of detector output to total gas odor level on a wide variety of gases. Refinement of the combing rules is anticipated as more field data become available.

3890 APTIC NUMBER 12458

Lahmann, E
EFFECT OF THE MEASURING PERIOD UPON THE RESULTS OF AUTOMATIC CARBON MONOXIDE DETERMINATION AT A LOCATION. Staub (English translation), 28(9):29-31, Sept. 1968. 10 refs.

When planning and evaluating air measuring programs the question always arises as to the period or frequency of investigations required in order to obtain valid results. A duration of measurements were made to evaluate carbon monoxide pollution in city air. It has been concluded from the results of these automatic measurements of carbon monoxide concentration, carried out along a busy road, that average and maximum immissions can, as a rule, be evaluated with sufficient reliability from measured data for any month. No statement of general validity may, however, as yet be made with regard to the question whether it is also possible to obtain, after a relatively short time, representative measured data on air pollution in the case of other measuring tasks in which the immission measuring point is situated at a short distance from the emission source.

3891 APTIC NUMBER 13022

Lahmann, Erdwin and Karl-Ernst Prescher
HYDROGEN SULFIDE DETERMINATION IN AIR WITH AUTOMATIC SAMPLING. (Schwefelwasserstoff-Bestimmung in Luft mit automatischer Probenahme.) Text in German. Wasser Luft Betrieb, 12(9):529-531, Sept. 1968. 9 refs.

A simple procedure is described for H2S determination based on photometric measurement of methylene blue formed in the reaction of H2S with diethyl-p-phenylenediamine in the presence of Fe(III) chloride. Samples of atmospheric air are passed through an alkaline cadmium hydroxide suspension which blinds the H2S present as cadmium sulfide. Its usefulness for determination of the H2S content of contaminated air can be enhanced by automatic sampling with the aid of a commercially available control device with 12 standard impingers. However, the following conditions must be met: (1) the cadmium hydroxide suspension in the impingers must be freshly prepared in order to maintain its absorption capacity for at least 24 hrs; (2) the cadmium sulfide suspension formed upon sampling must remain stable for at least 24 hrs; and (3) the volume of the air sample must be measured with sufficient accuracy. Tests designed to find out whether these requirements can be met gave positive results. In addition, tests to determine the cross-sensitivity of the H2S determination to SO2 and NO2 showed that it is not perceptibly affected by the presence of 1 mg/cum of SO2 or NO2 in the air sample. However, in the presence of these quantities of SO2 and NO2, the cadmium sulfide content of the absorption suspensions was lowered by about 20%. This effect could be leiminated by adding 5 ml of a 1.2% solution of ammonium amidosulfonate to 400 ml of the alkaline cadmium hydroxide suspension.

3892 APTIC NUMBER 12454

Langer, G.
THE LANGER ACOUSTIC PARTICLE COUNTER. Staub (English translation), 28(9):13-14, Sept. 1968. 5 refs.

An instrument is described which counts particles by means of an acoustic signal produced by the passage of the particles through the counter. The principles of the counter's operation are discussed. An experiment shows the point at which the signal is generated. Measurement results give information on signal strength as related to capillary size. The affect of atmospheric pressure on the sensitivity of the counter is discussed. The ability of the counter to determine particle size is questioned. Experiments show that particle size determination is not possible.

3893 APTIC NUMBER 13080

Langer, G.
STATUS OF ACOUSTIC PARTICLE COUNTER RESEARCH. Powder Technol., 2(5):307-309, June 1969. 8 refs.

The acoustic sensor developed at the National Center for Atmospheric Research consists of a 2.5 cm glass tube that gradually tapers into a capillary 1.5-5.0 mm in diameter and 6 cm long. The capillary expands abruptly back to the original 2.5 cm in the exit section. A pressure drop of 150 mm Hg gives air passing through the counter a velocity of approximately 50 m/sec. Airborne particles over 20 microns in diameter produce loud, audible clicks which can be counted or recorded electronically. Experiments were conducted to determine exactly how the counter works. Results indicated that the shock wave originates in the boundary layer of the capillary. As a particle reaches the laminar boundary layer, it forms a parcel of turbulence in the layer. This parcel then floats downstream to the exit and becomes enlarged enough to cause momentary turbulence of the laminar jet. The counter responded to all particles over 40 microns; below that more and more were missed, until at 10 microns no signal was given. The poor correlation of particle size with signal amplitude was explained by the randomness in contact of the particles with the boundary layer of the capillary.

3894 APTIC NUMBER 12660

R. M. Lhermitte
INDIRECT PROBING OF CLOUD AND PRECIPITATION BY MICROWAVE RADIOMETER. ISA (Instr. Soc. Am.) Trans., 7(2):138-142, 1968. 9 Refs.

The radiation temperature observed with a microwave radiometer is related to the total absorption of the medium along the path defined by the radiometer antenna. When cloud and precipitation exist along the path, these hydrometeors account for most of the absorption. When the particles are small with respect to the receiver wavelength, the radiation temperature is conveniently related to the total liquid water along the path. The paper discusses application and possible future development of radiometry to precipitation probing and weather analysis. (Author's Abstract)##

3895 APTIC NUMBER 12254

Stuart M. Martens, and Kelly W. Thruston
MEASUREMENT OF TOTAL VEHICLE EVAPORATIVE EMISSIONS. Preprint, Society of Automotive Engineers, Inc., New York, 13p., 1968. 7 refs. (Presented at the Automotive Engineering Congress and Exposition, Detroit, Mich., Jan. 8-12, 1968, Paper 680125.)

A sealed plastic enclosure was proposed in February, 1967, by M.P.W. as a technique for measurement of fuel system evaporative emissions from an automobile. Early work with this technique uncovered problems such as car background emission. Subsequent experimental work, however, has solved these problems and has shown the sealed enclosure capable of correctly measuring total vehicle evaporative emissions. It measures fuel vapors which actually reach the atmosphere in a simple, direct way, without the necessity for vehicle modification. A complete description of the enclosure is given and its use by GM is described. (Authors' abstract)##

3896 APTIC NUMBER 12973

McCcannaughey, Paul W.
DETECTION OF ALCOHOLS IN GAS ATMOSPHERES. (Mine Safety Appliances Co., Inc., Pittsburgh, Pa.) U. S. Pat. 3,455,654. 2p., July 15, 1969. 3 refs. (Appl. June 1, 1965, 4 claims).

A method of detecting alcohols in the air consists of passing the atmosphere to be tested through a reagent comprising a soluble hexavalent chromium compound and a pentavalent phosphoric acid on an inert carrier. In the presence of an alcohol, the color of the reagent changes from yellow to green. Quantitative determination can be obtained by scanning the reagent in a transparent tube and determining the length over which the color change occurs when a fixed volume of air at a fixed flow rate is passed through the tube; the length over which the color change occurs is compared with the calibrated results. The invention is applicable to the determination of the Threshold Limit Value of the ACGIH, i.e., the concentration to which workers may be repeatedly exposed without adverse effect. (Author abstract modified)

3897 APTIC NUMBER 12663

R. G. McTaggart, C. A. Miller, B. Pearce
QUANTITATIVE HYDROCARBON GAS ANALYSES USING ALUMINA-PACKED GLASS CAPILLARY COLUMNS. J. Inst. Petrol., 54(538):265-277, Oct. 1968. 11 Refs.

The experimental conditions necessary to obtain quantitative hydrocarbon gas analysis by gas chromatography using alumina-packed glass capillary columns (0.01 inch id) and flame ionization detection are described. These conditions include the method of reducing the activity of the alumina and the procedure for maintaining a high and constant column performance. The deviation of detector response from true weight proportionality and the need to apply determined correction factors are shown. The quantitative results of a number of analyses of blends of saturated and unsaturated hydrocarbon gases are presented and statistically assessed repeatability figures are given. Analysis times are about a half of that required when using the conventional (3/16 inch id) columns. Inorganic gases, if present, must, however, be determined by other means. Chromatograms are shown to illustrate the application of these columns to the quantitative analysis of saturated and unsaturated hydrocarbon refinery gas streams, and also to natural gas samples. (Author's Summary)##

3898 APTIC NUMBER 13099

Merkel, J. A., T. E. Hazen, and J. R. Miner
IDENTIFICATION OF GASES IN A CONFINEMENT SWINE BUILDING ATMOSPHERE. Trans. ASAE (Am. Soc. Agr. Engrs.), 12(3):310-313, May-June 1969. 11 refs.

In addition to the already known fixed gases, CO2, CO, H2S, NH3, and CH4, the environment within a confinement swine unit was found to contain a complex mixture of volatile organic intermediates. These intermediates are important in the characteristic odor resulting from the storage of manure and are suspected as being important in animal and building performance. Consideration of physical, as well as organic, biochemical phenomena, indicated that the important intermediate products of anaerobic manure decomposition include organic acids, amines, amides, alcohols, carbonyls, and sulfides. Qualitative chemical analysis confirmed the presence of these homologous groups except for organic acids that were decomposed upon formation by the high pH maintained within the manure storage pit. Physiological odor investigations were conducted to indicate the important compounds in the specific odors in swine buildings. Results indicated that the major odor constituents are from the amine and sulfide groups. (Author summary modified)

3899 APTIC NUMBER 13081

Herz, Otto
PRACTICAL ANALYSIS OF WASTE GASES FROM ENAMEL PAINT DRYING FURNACES. (Praxisnahe Bestimmung von Abgasen aus Lacktrockenofen). Text in German. Abwasser, Abgas Schwebstofftechnik, Dechema Monograph., 59(1045-1069):199-207, Frankfurt am Main, Deutsche Gesellschaft fur chemisches Apparatewesen E.V., 1968. 12 refs.

Waste gases from enamel paint drying furnaces are complex mixtures of organic substances and small amounts (usually less than 1%) of gaseous pollutants developing during drying of bonding agents. Nothing is yet known about the composition of these gaseous pollutants, although an ordinance regulating the emissions of drying furnaces has been drafted in the West German state of North Rhine-Westphalia, stipulating that not more than 100 mg combustible substances/cu m be emitted with the waste gas. Thus, there exists an urgent need to determine the concentration of combustible gaseous pollutants. One such unit suitable for fast determination would be the so-called explosimeter, of which various types are available and which are highly sensitive. Multi-gas detectors, of which three varieties exist, are indispensable for such measurements. Qualitative evaluations can be carried out with the test tubes 'Qualitest' and 'Polytest'. The sensitivity of these units lies below the odor threshold. Both test tubes, which are by different manufacturers, react to many organic substances; however, coloration and intensities of the two units differ. They can be used for almost all solvants. Moreover, Polytest tubes may be also used for quantitative analyses. Such test tubes are manufactured for phenols, formaldehydes and sulfurous acids. They are suited for measurement in a temperature range of 0 to 40 C. With the phenol test tube, concentrations of 0.026 ppm can be measured. The measurement range of formaldehyde test tubes extends from 2 to 40 ppm. Concentration measurements of sulfur dioxide can also be performed. Such measurements are of importance when oil-fired drying furnaces are used. Test tubes for quantitative analyses of all gaseous hydrocarbons are still in the develcpmental stage.

3900 APTIC NUMBER 13659

Misaki, Masao
THE MEASUREMENT OF THE SIZE SPECTRUM OF SUBMICRON-SIZE AEROSOLS. (Sabu-mikuron aerozoru ryukei bunpu no sokutei). Text in Japanese. Kuki Seijo (Clean Air-J. Japan Air Cleaning Assoc., Tokyo), 6(3):27-40, Aug. 1968. 28 refs.

Aerosols larger than one micron have been widely studied from the viewpoints of 'cloud physics' or air pollution. However, little is known as yet about aerosols smaller than one micron, partly because they present a less pressing problem, but chiefly because of technical difficulties in measurement. No direct method presently exists for measuring the size of these submicron-size aerosols. An optical microscope allows only identification of particles down to 0.00005 cm. An electron microscope is impractical, since its electron beam can cause deformation or evaporation of the particles. To obtain the size spectrum of these aerosols, indirect methods are the only tools available. They include the condensation method, the use of the diffusion coefficient spectrum, the use of the mobility spectrum, and the sedimentation rate method. The basic concepts of these techniques are reviewed and current developments in their application are discussed. It is concluded that these methods would be more valuable for a study of electrons in the atmosphere or of radiation activities in nature. Simple measurements of the number of small and large ions, as have been made for years, seem to be meaningless. Further investigations on the change of the size spectrum of submicron aerosols are required.

3901 APTIC NUMBER 12665

Anon.
ODOR PANEL SMELLS TROUBLE. Mod. Mfg., 1(7):168, Dec. 1968.

The largest cause of public complaints against industrial air pollution in this country is noxious odors. Two methods for testing effectiveness of odor control are the odor panel of sensitive individuals and the Scentometer, an instrument favored by many pollution enforcement agencies.##

3902 APTIC NUMBER 13132

Monomakhoff, Alexandre
APPARATUS FOR EXTRACTION AND QUANTITY DETERMINATION OF GAS IN AIR. (Charbonnages de France, Paris) U. S. Pat. 3,449,939. 4p., June 17, 1969. 5 refs. (Appl. May 3, 1966, 5 claims).

A new portable instrument for the extraction and quantity measurement of a gas in air offers greater convenience in use due to its small size and new shape. The outer case of the instrument is manufactured from an elastically deformable material such as rubber. The outer case contains a housing in which the air extraction device and a separate chamber connected to the housing through an orifice are located. The outer wall of the housing contains a suction orifice, while the bottom of the chamber is equipped with an exhaust orifice. The gas detection system utilizes the method of catalytic combustion on the detector filament of a measuring bridge. The bridge consists of a detector filament, a compensating filament, two fixed resistances, and a variable resistance. A galvanometer in series with another variable resistance serves as an indicator. A rechargeable battery pack is supplied to power the equipment.

3903 APTIC NUMBER 12457

Olaf, Joern and Josef Somolyai
TWO-CHANNEL FRACTIONETER FOR THE PARTICLE SIZE ANALYSIS OF SUSPENDED DUST. Staub (English translation), 28(9):25-29, Sept. 1968. 2 refs

In 1962, an instrument was described which fractionates dust particles in a horizontal channel according to their settling

velocity. At a given point only particles of a specific settling velocity can therefore be found. The evaluation of samples obtained in this fractionometer can therefore be limited to optically counting the particles deposited in discrete zones of the channel bottom. This paper now describes a modification of that instrument. Underground tests were run which yielded a series of results, leading to improvements and redesign of the instrument. By using two measuring channels operated simultaneously it is possible to widen the measuring range. By carrying out the measurement in a proper way it is possible directly to obtain the mean value for a particle size analysis over a long period. An instrument of a design suitable for use in coal mining is thus available.

3904 APTIC NUMBER 13207

Oomichi, Sadao
ON THE STUDY OF THE SIZE DISTRIBUTION OF SUSPENDED PARTICULATES IN THE ATMOSPHERE (1). THE SEPARATION OF RESPIRABLE DUSTS IN SUSPENDED PARTICULATES. (Taikichu no fuyu baizin ryudo bunpu ni kansuu kenkyu (1) Fuyu baizinchu no respirable dust no bunri). Text in Japanese. Kuki Seijo (Clean Air-J. Japan Air Cleaning Assoc., Tokyo), 6(5):71-74, Nov. 1968. 2 refs.

Respirable dusts were simultaneously separated from suspended atmospheric particulates in Kawasaki city by a High-Volume Air Sampler and a Cyclone High-Volume Air Sampler; the latter was a combination of the usual high volume sampler and a cyclone. The size distribution of suspended particulates and respirable dust was then measured with an Andersen Sampler having a multipore filter stage. Measurements obtained with the Andersen Sampler indicate that respirable dusts less than 3.3 microns constitute 50 to 70% of all dusts. The size distribution of suspended particulates follows normal log distribution, and mass percent is directly proportional to particle diameter. The size distribution of respirable dusts caught by the Cyclone High-Volume sampler also approximated normal logarithmic distribution. Average 24-hr concentrations of total and respirable particulates were obtained. The average concentration of respiratory particulates in a ten-day period was 49%. The Cyclone High-Volume Air Sampler is recommended for further research into airborne particles.

3905 APTIC NUMBER 13122

Otto, J.
APPLICATION OF COMPLEXOMETRY IN METAL DETERMINATIONS FOR LABOR HYGIENIC PURPOSES. I. DETERMINATION OF LEAD IN INDOOR AIR. (Uber die Anwendung der Komplexometrie bei Metallbestimmungen fur arbeitshygienische Zwecke. I. Mitteilung: Bestimmung von Blei in der Raumluft). Text in German. Z. Ges. Hyg. (Berlin), 15(5):323-325, May 1969. 15 refs.

The method of complexometric micro titration for measurement of indoor airborne lead compounds is described. The complexometric method surpasses the photometric method in ease and speed. The method sufficiently accomplishes the measurement of the low concentrations admissible in occupational health and industrial hygiene. Disturbing ions and their elimination are discussed. (Author summary modified)

3906 APTIC NUMBER 12666

J. N. Pitts, Jr., G. W. Covell, D. R. Burley
FILM ACTINOMETER FOR MEASUREMENT OF SOLAR ULTRAVIOLET RADIATION INTENSITIES IN URBAN ATMOSPHERES. Environ. Sci. Technol., 2(6):435-437, June 1968. 17 refs.

A versatile chemical actinometer, suitable for field as well as laboratory studies, has been developed for the measurement of radiation intensities in the near-ultraviolet region. The actinometer is a thin film of poly(methyl methacrylate) in which the actinic material, o-nitrobenzaldehyde, is dispersed. On absorption of light in the 2800 to 4100 A. region o-nitrobenzaldehyde photoisomerizes to o-nitrobenzoic acid with a quantum efficiency of 0.50. The extent of this reaction upon irradiation can be related to the intensity of the radiation source. This actinometer is suitable for measuring solar radiation intensities within the region 3000 to 4100 A., the photochemically reactive wavelength region for the production of photochemical smog. (Author's Abstract)##

3907 APTIC NUMBER 12972

Plantz, Charles A. and David G. Hannan
DETECTION OF MISSILE FUELS IN GAS ATMOSPHERE. (Mine Safety Appliances Co., Inc., Pittsburgh, Pa.) U. S. Pat. 3,455,655. 2p., July 15, 1969. 3 refs.

A rapid and reliable method is described for detecting a volatile nitrogen compound in the group consisting of hydrazine, hydrazine hydrate, red fuming nitric acid (RFNA), unsymmetrical dimethyl hydrazine (UDMH), and alkyl hydrazines in a gas. The invention is based on the discovery that readily observable color changes occur when air or other gas containing the compounds is passed into contact with a reagent consisting of a hexavalent chromium compound and a pentavalent acid on an inert carrier. In the presence of UDMH, for example, the reagent changes from yellow-orange to green or blue. The hexavalent chromium compound may be supplied as chromium trioxide or as a soluble chromate or dichromate. The phosphoric acid may be orthophosphoric acid, metaphosphoric acid, or other acid of pentavalent phosphorus. Among the carriers that might be used is HCl-purified silica gel which insures maximum intensity of the color change. Satisfactory response of the reagent to the presence of the volatile nitrogen compounds is possible by passing the atmosphere, as by an aspirator bulb or a fixed flow rate pump, to be tested through the reagent confined in a canister with a window for viewing. For spot checks the atmosphere to be tested may be passed through the reagent disposed in a smaller transparent tube.

3908 APTIC NUMBER 13658

Rasa, S. and A. Paggi
APPARATUS FOR GRANULOMETRIC DETERMINATION OF SMOKES AND POWDERS THROUGH COLLECTION OF SLIDES. (Apparato per determinazioni granulometriche di fumi e di polveri mediante raccolta su vetrino). Text in Italian. Riv. Combust., 23(6):325-328, 1969.

An apparatus is described which uses a pressure drop to deposit on test slides the solid particles in smoke or other powders to be examined under the microscope to determine particle size. By this method, the problems of particle aggregation and the loss of smaller particles due to swirl are eliminated or at least mitigated. Results are reported for various samples taken for testing smoke from flares and engine exhaust gases. (Author summary modified)

3909 APTIC NUMBER -----

Rasa, S.
TRIALS ON A METHOD FOR DETERMINING SMOKE GRANULES THROUGH SEDIMENTATION IN A TUNNEL. (Prove sperimentali di orientamento su un metodo di granulometria di fumi per sedimentazione in tunnel). Text in Italian. Riv. Combust., 23(3):132-135, March 1969.

A method is proposed for determining the distribution of solid particles contained in smoke according to their size. The smoke is sent through a tunnel sufficiently long and a few millimeters high, and the decrease in sediment on the bottom of the tunnel is measured. The first tunnel used for these trials was 1 long and 5 mm high. The percent distribution of differently-sized particles on the basis of an average diameter was determined by microscopic comparison of about 2500 particles on 30 consecutive sample slides. While this percent distribution cannot be considered rigorously precise, its trend line, showing smaller average diameters as the measurement slides are placed from the beginning to the end of the tunnel, shows that the system proposed is a reliable one. (Author abstract)

3910 APTIC NUMBER 13906

Reiter, Reinhold and Walter Carnuth
WASHOUT INVESTIGATIONS AT FALLOUT PARTICLES IN THE LOWER TROPOSPHERE BETWEEN 700 AND 3000 M A. S. L. (Washout-Untersuchungen an Fallout-Partikeln in der unteren Troposphaere zwischen 700 und 3000 m NN). Text in German. Arch. Meteorol. Geophys. Bioklimatol. Ser. A (Vienna), 18(1-2):111-146, 1969. 47 refs.

Continuous, simultaneous measurements of the specific radioactivity from fission products in air and precipitation have been made since December 1963, at three sites in the Bavarian Alps (Garmisch-Partenkirchen, 730 m, Wank summit, 1780 m, and Zugspitze peak, 2966 m above sea level. These stations are closely spaced and are horizontally and vertically equidistant. The specific capture cross-section and the fraction of the activity obtained from precipitation in a layer of given thickness were computed from the data. The relative decrease of the abundance of fission products in air was also determined and compared with the fraction of activity. Thus, quantitative characteristics for the washout process were derived and classified with reference to the type of precipitation. Means and frequency distribution statistics were derived from the data and compared with theoretical and observational results reported by others. Furthermore, the influence of several meteorological parameters was studied. Cable car soundings were processed to obtain a quantitative estimate of the errors induced by the evaporation of falling precipitation under various conditions. Possible explanations for the very frequently reported decrease in specific precipitation activity within the melting zone are discussed. The height at which precipitation radioactivity would vanish if subjected to linear attenuation was determined by extrapolation. By comparing the result of the computations with the assumed height of the cloud tops, it was found that the amount of activity incorporated in falling precipitation is relatively small compared to the fallout captured by the washout process. (Author summary modified)

3911 APTIC NUMBER 13151

Roberts, Charles C. and David G. Hannan
DETECTION OF VOLATILE HYDRAZINE COMPOUNDS. (Mine Safety Appliances Co., Inc., Pittsburgh, Pa.) U. S. Pat. 3,455,656, 2p., July 15, 1969. 5 refs. (Appl. July 6, 1965, 12 claims).

A rapid and reliable method for detecting volatile hydrazine compounds is based on the discovery that readily observable color changes occur when gases containing these compounds are brought into contact with a composition of silicic acid and a molybdic acid on a solid, inert carrier. Silica gel is the preferred carrier, but suitable carriers include coated waterproofed papers and filter papers, membrane filter materials, glass beads or plates, glass beads coated with a film of absorbent clay, and granular absorbent materials such as pumice. The molybdic acid may be supplied as a solution of a molybdic acid or as a solution of a water soluble molybdate acidified with sulfuric acid. The silicic acid may be provided as a solution of a soluble silicate, such as sodium, potassium, and rubidium metasilicates and orthosilicates, acidified with sulfuric acid. When silica gel is used as a carrier, the silicic acid component is provided by acidification of the silica gel in the presence of molybdic acid. An inert carrier is impregnated with the substantially dry residue of an aqueous solution of the silicic and molybdic acids. In the presence of hydrazine compounds, the color of the reagent solution will change from yellow or yellow-green to blue or blue-green. Unlike the other indicators, silica gel is not sensitive to ultraviolet radiation.

3912 APTIC NUMBER 12258

E. Sawicki, and C. R. Engel
FLUORIMETRIC ESTIMATION OF ACRIDINE IN AIRBORNE AND OTHER

PARTICULATES. Preprint, Public Health Service, Cincinnati, Ohio, National Center for Air Pollution Control, ((16))p., Feb, 1968. 10 refs.

Two methods are described for the separation of acridine from organic airborne particulates or coal-tar-pitch. A basic fraction was not necessary for these analyses. With the help of instant thin-layer chromatography (ITLC) with glass-fiver paper impregnated with silica gel, acridine was separated in 18 min. from the tens of thousands of other compounds in the sample. Separation by paper electrophoresis required about 100 min., but the separation was sharper in that acridine and an alkylacridine were separated from each other and also from the quinolinic compounds above them, the larger aza arenes below them, and the innumerable non-basic compounds at the origin. After separation, the samples were assayed by scanning the standard and unknown acridine spots at F 345/475. Although the electrophoretic method requires more time, it is superior to the ITLC method for estimation of acridine in samples from urban air and from source effluents. (Authors' abstract)##

3913 APTIC NUMBER 13361

Scheck, H. F., T. A. Gray, and P. C. Snowden
CONTINUOUS SO2 ANALYSIS REDUCES AIR POLLUTION. Water Sewage Works, 116(7):IW/2 to IW/6, July 1969.

Tests of wet and dry sampling techniques indicated the advantages of an infrared analyzer for the continuous sampling and recording of the sulfur dioxide content of a power plant station's boiler flue gas. The system developed has all its major components in a single cabinet, and the probe outlet is directly connected to this cabinet. Filters are installed both at the probe intake within the stack and at the probe outlet. Filters with a surface area of 1.1 sq ft have been found to remove 95% of dirt particles 0.015 micron or larger. A high constant flow rate and elimination of elbow fittings have minimized the problem of plugging in the probe tube. The system has performed satisfactorily for several months. Preventive maintenance measures include a daily visual check for flow rate, a weekly zero analyzer check made with nitrogen gas, and a monthly span check using a calibration gas of known SO2 concentration.

3914 APTIC NUMBER 13169

Schreiber, Hermann and Fritz Woerner
CONTRIBUTION TO THE DETERMINATION OF THE AVERAGES DELAY-TIME OF NATURAL AEROSOLS; METHOD AND FIRST RESULTS. (Beitrag zur Bestimmung der mittleren Verweildauer von naturlichen Aerosolen; Methodik und erste Ergebnisse). Text in German. Arch. Met. Geoph. Biokl., Ser. A., 18(1-2):75-86, 1969. 9 refs.

The average suspension time of aerosols was determined from the disturbance of radioactive equilibrium caused by the activities of radium (Ra) D and E nuclides. The experimental method used is described in detail, with special attention given to the preparation of the fiberglass filter designed to collect the aerosols and to the chemical separation of bismuth and lead. In this process, daughter-products of thorium were used as radioactive tracers in the analysis of RaD and RaE. Analytic results are reported. Attention is called to the importance of measuring strontium 90 deposited on the filter when estimating the stratospheric portion of RaD. (Author abstract modified)

3915 APTIC NUMBER 13459

Seal, Morgan S., William A. Mills, and James G. Terrill, Jr.
NEUTRON ACTIVATION ANALYSIS. Pub. Health Rept. (U.S.), 72(4): 329-336, April 1957. 8 refs.

The general principles of neutron activation analysis are discussed. It is felt that this method may be used for detecting and measuring trace quantities of contaminants in solids and liquids. Any nuclear reaction producing a radioactive isotope that may be identified by its characteristic radiation can be used for activation analysis. The most frequent nuclear emission is the gamma ray. Observation of gamma activity allows the decay rate to be ascertained. The energy and the decay rate are normally sufficient to determine exactly what nuclear species are present and their quantitiy. A general procedure for irradiation in a nuclear reactor of the sample to be tested is described. Radio chemical analysis depends on the element being determined. The analysis of copper in nickel oxide, copper in animal tissue, and sodium in cast iron was calculated. Limitations of the process are listed with the main limitation being that the isotope formed may result from neutron reactions other than the planned reaction, and the future of the process in the public health services was stressed.

3916 APTIC NUMBER 12999

Setzer, David E.
COMPARISON OF MEASURED AND PREDICTED AEROSOL SCATTERING FUNCTIONS. Appl. Opt. 8(3):905-911, May 1969. 7 refs.

The normalized phase function and the scattering coefficient of an aerosol were predicted from measurements of aerosol particle size distribution, density, and index of refraction in a controlled laboratory experiment. The predictions are based on Mie's solution for a single sphere applied to an aggregate of water droplets. The experiment was conducted with a helium-neon laser at 6328 Angstroms as the source. The shapes of the size distributions obtained from the counter and the Dessens method were similar. All corresponding predicted and measured phase functions agreed. The Dessens method can be used to calibrate the counter density. It is concluded that valid predictions can be made by using a highly efficient light scattering particle counter as the data collecting device.

3917 APTIC NUMBER 13627

Shigeta, Yoshihiro
ODOR PROBLEM IN ROOMS. I. ODOR MEASUREMENT. (Shitsunai Kankyoka ni okeru Shuki mondai. I. Shutoshite Shuki Sokuteiho ni tsuite.) Text in Japanese. Kuki Seijo (Clean Air - J. Japan Air Cleaning Assoc., Tokyo), 6(5):62-70, Nov. 1968. 5 refs.

The delay in the treatment of odor problems is mainly due to the lack of proper method of odor measurement. An Odor Study Group was formed in 1965 and studies on odor measurement have been carried out by the following five methods: olfactory method, Kitagawa's detecting tube method, dilution method, absorption method, and gas chromatography. The most common method for evaluating odor at the present time is by the sense of smell. The proper selection and appropriate training of technicians is mandatory for this purpose. These technicians must memorize and be able to differentiate about 60 to 70 kinds of odor. They are also required to express the degrees of odor with proper expressions. In order to express these results numerically, the ASTM dilution method or non-odoring chamber method has been used. Individual sensitivity differences and difference in modes of expression among the technicians are still unavoidable, although the differences are minimal. Using the non-odoring chamber, standard concentration levels (threshold, unpleasant, and hazardous concentrations) have been obtained for hydrogen sulfide, trimethylamine, and ammonia.

3918 APTIC NUMBER 12805

Simecek, Jaroslav and Jiri Kubalek
EXPERIENCES WITH CYCLONE PRESEPARATION IN DUST SAMPLING. Staub (English Translation), 28(10):24-30, Oct. 1968. 8 refs.
CFSTI TT 68-50448/10

A vortex pre-separator of an air flow rate of 10 l/min has been used for the separation of coarse dust during sampling. As results of this a respirable fraction and a non-respirable fraction are obtained. The cyclone permeability approximately corresponds to the dust retention of the lungs. The total dust concentration and fine dust concentration, total separation efficiency and fractional separation efficiency, and limiting particle size have been determined by means of three types of test dust. It is recommended to introduce and standardize the method for measuring dust to check hygienic conditions in a working place. (Author Summary)

3919 APTIC NUMBER 13711

Sova, B.
A CONTRIBUTION TO THE DETERMINATION OF LACQUER PETROLEUM IN ATMOSPHERE. (Prispevek ke stanoveni lakoveho benzinu v ovzdusi). Text in Czech. Cesk. Hyg. (Prague), 13(1):54-58, 1968. 5 refs.

The nephelometric method appears to be a suitable one for the determination of lacquer petroleum vapors in the air, as it has sufficient sensitivity and reproducibility. The sensitivity of the method is unfavorably influenced by the presence of aromatic hydrocarbons. The higher the average molecular weight of the petroleum, the more intense the cloudiness. The composition of lacquer petroleum and related solvents for colors and lacquers changes, and therefore, a new calibration curve must be established for any special case. The petrol for colors and lacquers necessary for the calibration is obtained by means of vacuum distillation of the paint matter; at the same time the distilled liquid is substituted by a high-boiling compound distilled in the given conditions. (Author summary modified)

3920 APTIC NUMBER 13076

Stevens, R. K., A. E. O'Keeffe, and G. C. Ortman
ABSOLUTE CALIBRATION OF A FLAME PHOTOMETRIC DETECTOR TO VOLATILE SULFUR COMPOUNDS AT SUB-PART-PER-MILLION LEVELS. Environ. Sci. Technol., 3(7):652-655, July 1969. 8 refs.

Permeation tubes were used to obtain an absolute calibration of a flame photometric detector (FPD) to sulfur dioxide, hydrogen sulfide, methyl mercaptan, and carbon disulfide. Response data was obtained from 0.001 to 10 ppm for each compound. Preliminary experiments with the FPD as an ambient air sulfur dioxide monitor indicated that the detector has potential utility as a continuous monitoring device. (Author abstract modified)

3921 APTIC NUMBER 13150

Yada, Osamu
ON THE METHODS OF EVALUATING THE EXPOSURE TO TOXIC SUBSTANCES BY ANALYZING THE METABOLITES IN THE BODY. (Tainai taisha sanbutsu ni yoru yugaibutsu hakuro hyokaho). Text in Japanese. Rodo Kagaku (J. Sci. Labour, Tokyo), 45(4):171-183, 1969. 177 refs.

Under certain conditions, the amount of toxic substance absorbed by workers exposed to toxic air contaminants cannot be predicted from air analysis data. If the concentration of metabolites in tissue or excreta is proportional to that of the toxic substance in the air, the degree of adverse exposure may be evaluated by analyzing samples of expired air, blood, urine, or hair, with reference to atmospheric threshold limit values. Tests for assessing the level of exposure to carbon monoxide, mercuric vapor, inorganic lead, and chlorinated hydrocarbons are discussed. Of the various methods developed for determining the carboxyhemoglobin level in the blood of workers exposed to carbon monoxide, the 20-second breath holding method is the most practical and convenient. If the determination is carefully made, the urinary excretion of mercury can be used as an indicator of exposure to mercuric vapor. The absorption of lead varies according to whether it is absorbed as fume or dust. Therefore the degree of exposure should be evaluated by analyses of lead in urine or blood during repeated exposure. The storage of lead in the body can be determined by the increase in urinary excretion of lead following the administration of calcium

ethylenediaminetetraacetate. The determination of urinary excretion of alkaline-pyridine reactants is tentatively suggested as an indicator of exposure to chlorinated hydrocarbons. (Author abstract modified)

3922 APTIC NUMBER 13103

Yamioka, Yasuo
DETERMINATION OF MANGANESE IN LEAVES WITH RELATION TO AIR POLLUTION. (Mn ni yoru taiki osen ni kansuru kenkyu). Text in Japanese. Shikoku Igaku Zasshi (Shikoku Acta Medica), 25(1): 161-169, Feb. 25, 1969. 18 refs.

To estimate environmental contamination by manganese dust emitted from a manganese-processing factory, evergreen trees were selected as indicator plants and the manganese content of their leaves was determined. In a sample of 198 old leaves, the leaves containing relatively high amounts of manganese were those of Camellia japonica L. and Camellia Sasanqua Thunb. The leaves containing relatively low amounts of manganese were those of Cryptomeria japonica D. Don and Nandina domestica Thunb. Old leaves had the highest manganese content; spring leaves the smallest. In the area of the manganese-processing plant, the leaves of Cryptomeria japonica D. Don showed high manganese concentrations. As the distance from the factory increased, the concentrations decreased. It is concluded that this plant is an acceptable indicator of manganese contamination. (Author summary modified)

3923 APTIC NUMBER 13105

Fanzman, Herbert D.
ATMOSPHERIC MEASURING SYSTEM. (Winslow Tele-Tronics, Inc., Asbury Park, N. J.) U. S. Pat. 3,447,370. 4p., June 3, 1969. 3 refs. (Appl. Apr. 10, 1967, 8 claims).

This invention relates to a means for determining the amount of loss in transmission of light through an atmosphere. The measuring system is useful in measuring fog, smoke, and other forms of air pollution. One of the features of the invention includes a switching means and electrical adjustments for first calibrating the system and then for determining directly the percentage loss of light in the atmosphere. The present system employs a laser light generator which produces an intense beam of light in the deep red portion of the spectrum. A first detector, shielded by a monopass filter, is positioned about 500 ft from the laser generator. A second and similar detector, also protected by a monopass filter, is placed adjacent to the generator with means for illuminating a photosensitive transducer by a beam splitter reflector. The device is not affected by ambient illumination because of the deep red color of the filters and because of the directive quality of the light generator. Switching means are arranged for first setting the output meter at a maximum reading designating a clear visual path, and then switching to a measuring circuit which includes both detectors and a regulated voltage source to determine the percentage of light transmission.

3924 APTIC NUMBER 13779

Thompson, C. J., H. J. Coleman, C. C. Ward, and H. T. Hall
DESULFURIZATION AS METHOD OF IDENTIFYING SULFUR COMPOUNDS. Anal. Chem., 32(3):424-430, March 1960. 11 refs.

A desulfurization technique is described for pure sulfur compounds and gas-liquid chromatography fractions of less than 0.0002 ml of sulfur compound concentrates from crude oils. The apparatus consists of an aluminum reaction tube packed with catalyst, a furnace for heating the reaction tube to the desired temperature, a motor-driven syringe for charging relatively large quantities of pure compounds, and the necessary adapters, valves, and connectors for handling very small trapped samples from the GLC column. Samples are passed through the apparatus at a temperature of 150 to 200 C, and the hydrocarbons produced upon desulfurization are collected and identified by gas-liquid chromatography. By analyzing the hydrocarbons produced, it is possible to determine the exact sulfur compounds found in the crude oil fractions. Data are presented showing the desulfurization of typical members of the sulfur compound classes: alkane and cycloalkane thiols, alkane and cyclic sulfides, thiophenes, and benzothiophenes.

3925 APTIC NUMBER 12985

Togino, K. and M. Yajima
ANALYSIS OF AIR POLLUTION BY ELECTRONIC COMPUTERS. (Denshi keisanki riyo ni yoru taiki osen no kaiseki). Text in Japanese. Kuki Seijo (Clean Air-J. Japan Air Cleaning Assoc., Tokyo), 6(7):29-33, 1969. 3 refs.

The application of electronic computers in the United States to analysis of air pollution is described and the need for such equipment explained. Data analysis by computers starts with the measurement of the concentration of air pollution. The computers then change the data into digital signals which are sent to the air pollution control center by pulse system so that the data can be converted to punched paper tapes or cards for classification. Cooperative Air Network, Continuous Air Monitoring Program, Mobile Air-Sampling Station, and Telemetered Air Monitoring were presented as examples of computer applications. The study indicated a strong need to use electronic computers in the future due to the complexity of monitoring air pollution data.

3926 APTIC NUMBER 12993

Walker, Alfred O.
METHOD AND APPARATUS FOR DETERMINING THE PRESENCE OF VOLATILE ORGANIC LEAD COMPOUNDS IN THE ATMOSPHERE. (Nalco Chemical Co., Inc., Chicago) U. S. Pat. 3,453,081. 3p., July 1, 1969. 1 ref. (Appl. July 23, 1965, 3 claims).

A method for determining the presence and quantities of volatile organic lead compounds in the atmosphere is described. A regulated stream of the air to be sampled is passed over iodine

crystals long enough to sublime at least one half of the crystals, but not all of them. The sublimed crystals carry with them the reaction product of the iodine and the volatile organic lead compounds. The lead compounds are collected on a porous substrate. The substrate is developed, preferably by passing a quantity of air over it, to remove any remaining free iodine. The resulting yellow color of the substrate serves as an indicator of the presence of volatile organic lead compounds in the air sampled. The amount of lead contained in the air sample can be determined by color comparisons with similar porous substrates which have been treated with known quantities of lead-iodine containing compounds.

3927 APTIC NUMBER 13000

Hartburg, Arthur F., John B. Pate, and James P. Lodge, Jr.
AN IMPROVED GAS SAMPLER FOR AIR POLLUTANT ANALYSIS. Environ. Sci. Technol., 3(8):767-768, Aug. 1969. 4 refs.

A gas sampling bubbler, consisting of easily assembled and replaceable glass and Teflon components, was designed to replace prior designs, which are both expensive and fragile. The new bubbler has proved to be rugged and easy to handle in the field. Tests made to compare the new device with an all-glass version have shown that no pollutant is lost during its very brief contact with the Teflon in the inlet. It is far less subject to damage than all-glass designs, but equally efficient in pollutant collection. Instructions for its use in the field are presented.

3928 APTIC NUMBER 12942

Wienke, E.
DETERMINING AND TESTING ODOR INTENSITY CURVES OF GASES AND ODORIZING AGENTS. (Ermittlung und Uberprufung der Geruchsintensitatskurven von Gasen und Odoriermitteln). Text in German. Intern. Z. Gaswaerme, 18(6):223-232, June 1969. 3 refs.

The odorizing of almost odorless natural gas is gaining increasing importance with increased use of the fuel on the European continent. Therefore, the development of odor measuring methods gains in urgency. Gaschromatic methods to determine the additive concentrations are expensive because of equipment costs and the need of highly trained personnel. An alternative approach is to measure odors subjectively by means of test persons. Instructions are given on how to perform such tests, and the use of the portable odorimeter and the odor testing chamber is described. The additive concentration for both is varied in steps as follows: 1.0 x 10 to the nth power, 1.8, 3.2, and 5.5 x 10 to the nth power, where n varies between -3 and +2. Ten measurements at each level should be made. The odor is subjectively classified according to five intensity levels. In most cases, a linear relationship between the odor levels and the log of the additive concentration can be expected. For higher precision an S-shaped curve can be fitted. Illustrative examples of graphical plots and numerical data analysis are given, the latter for the regression analysis.

3929 APTIC NUMBER 13581

Williams, A. M.
THE ADSORPTION OF SULPHUR DIOXIDE BY CHARCOAL AT -10 C. Proc. Roy. Soc., (Scotland), Vol 37, p. 161-172, 1916. 11 refs.

The adsorption of sulfur dioxide by blood charcoal at -10 C was studied, and measurements were taken of the amount adsorbed, the pressure, and the isothermal heat of adsorption at constant volume. The adsorption isotherm is a typical vapor adsorption curve, and runs the same course as that for the adsorption of water vapor. The heat of adsorption curve passes through a minimum and maximum, and then runs parallel to the adsorption axis. A tentative explanation of this is offered. The equipment used for this experiment is diagrammed, and the results are presented as graphs and in tabulated form.

3930 APTIC NUMBER 13153

Wisse, J. A. and A. J. Meerburg
OZONE OBSERVATIONS AT BASE KING BAUDOUIN IN 1965 AND 1966. Arch. Met. Geoph. Biokl., Ser. A., 18(1-2):41-54, 1969. 15 refs.

Continuous measurements of surface ozone concentration at Base King Baudouin, Antarctica were conducted in 1965 and 1966. The total amount of ozone was observed with a Dobson spectrophotometer and its vertical distribution was determined by means of the Umkehr effect and by launching 27 sondes of the Brewer-Mast type. Observations show that ozone concentrations increase at the surface south of the Antarctic coast and that this increase is also present in the upper air up to about 400 mbar. The ozone content is highest in winter and lowest in summer. These phenomena are tentatively explained as a consequence of the mean meridional circulation, the cyclonic activity, and the destruction of ozone at the surface of the Antarctic ocean. Umkehr observations indicate that above 30 km, the ozone content at Base King Baudouin is lowest in summer. The springtime stratospheric warming in 1965 and 1966, as well as a midwinter warming in 1966, are described. The midwinter warming occurred simultaneously in all levels down to the tropopause and did not interrupt the westerly airflow in the stratosphere. The springtime accelerated warming started in the higher levels and was propagated downward, accompanied by a decrease or a reversal of wind speed.

3931 APTIC NUMBER 12952

Yamamoto, A.
METHODS OF CONTINUOUS PARTICLE SAMPLING BY AIRCRAFT. J. Meteorol. Soc. Japan, 47(2):86-97, April 1969. 6 refs.

Three methods of continuous particle sampling are presented and their merits and defects are discussed. The replication method had an advantage because it was possible to record ice crystals and water droplets simultaneously. However, several precautions were required for the practical operation. The water-blue method was employed without difficulty, and the traces of water droplets were obtained very clearly. For the observation of clouds which had no hydrometeors this method was better than the replication method. The photomicrograph method was difficult to use in flight observations. Continuous airborn samplers were designed for these three methods. (Author abstract modified)

3932 APTIC NUMBER 13093

Yoshimura, Chozo, Hiroshi Hara, and Kunihiko Tamura
CONDUCTIMETRIC TITRATION OF CARBON MONOXIDE, SULFUR DIOXIDE, HYDROGEN SULFIDE AND THEIR MIXTURES WITH EDTA IN DIMETHYLFORMAMIDE. (Kanbonsanrui ni yoru hisuitekitei no kenkyu (EDTA dodenritsu tekitei ni yoru DMF chu ichisanka tanso no teiryo narabi ni aryusan gasu, ryukasuiso to kyozon suru baai no sorezore no teiryo). Text in Japanese. Japan Analyst, 18(6):689-693, 1969. 6 refs.

Non-aqueous titrimetry of CO, SO2, H2S and their mixtures with EDTA was investigated by conductimetric titration using dimethylformamide(DMF) as solvent suitable for EDTA. It was found by direct conductimetric titration that SO2 and H2S are dissolved in DMF forming an addition compound which reacts with EDTA at the molar ratios of 4:1 and 2:1. Results of IR observation showed that CO did not form an addition compound with EDTA, but reacted with dimethylamine (DMA) to form DMF equivalently. It is also shown by conductimetric titration in DMF that dimethylamine reacts with EDTA in DMF to yield four successive addition species (DMF:EDTA = 4:1, 2:1, 3:2, 1:1) and with SO2 or H2S to produce a soluble compound such as $(CH_3)_2NH.SO_2$. Carbon monoxide can be determined differentially from the result of determination of excess dimethylamine by dissolving CO in DMF containing a known quantity of dimethylamine and titrating with EDTA-DMF standard solution. In the case of a triple gas mixture using DMF containing dimethylamine, SO2 was first titrated in two steps, H2S also in two steps, and finally, the excess of dimethylamine in four steps. (Author abstract modified)

3933 APTIC NUMBER 13475

Zier, H.
DUST CONTENT MEASUREMENTS WITH MEMBRANE FILTERS.
(Staubgehaltsmessungen mit Membranfiltern.) Text in German. b. Meteorol., 20(1-6):68-77, 1968. 15 refs.

Since the end of 1964, continuous 24 hr gravimetric measurements of dust content with the aid of membrane filters were made at 10 widely-spaced stations of the Meteorological Service of East Germany The method of measurement, the membrane filters, an original filter-holder design, the rain shield of the dust collector head, and the effects of a progressive clogging of the filter are described. The filter membranes weigh very little, are almost entirely non hygroscopic, are readily soluble, and trap almost 100% of 0.1 micrometer particles, mostly at the surface of the membrane. These properties make such filters suitable for determination of mass concentration, particle-size distribution, and chemical constituents of aerosols. Some results of a statistical evaluation of the collected dust content, wind speed, and wind direction data are given. The dust content of atmospheric air at a given geographical location is determined by the location of dust sources and by meteorological factors. At all 10 stations, the dust content decreases with increasing wind speed. The annual variation of dust content is strongly dependent on the general meteorological situation. The low-altitude stations have a low dust content in summer and a high one in winter. At the high-altitude stations, the reverse is true. Weekly variation of dust content was detected at stations both close to and far from industrial sources.

3934 APTIC NUMBER 13040

Cavanagh, Leonard A., Conrad F. Schadt, and Elmer Robinson
ATMOSPHERIC HYDROCARBON AND CARBON MONOXIDE MEASUREMENTS AT POINT BARROW, ALASKA. Environ. Sci. Technol., 3(3):251-257, March 1969. 12 refs.

The concentrations of low molecular weight hydrocarbons and carbon monoxide in uncontaminated Arctic air masses were analyzed at Point Barrow, Alaska. Using gas chromatographic techniques, a variety of organic compounds were regularly observed in these air masses, and the following average concentrations were obtained: methane, 1.6 ppm; butane, 0.06 ppb; acetone, 1.0 ppb; and n-butanol, 190 ppb. Carbon monoxide concentrations averaged about 90 ppb. Special investigations confirmed the unexpected presence of n-butanol in these samples. Sources of these organics are postulated. (Author abstract)

3935 APTIC NUMBER 12649

W. H. Cock
AIR POLLUTION MEASUREMENTS IN AUSTRALIA. A SURVEY OF CURRENT METHODS AND DEVELOPMENTS. Clean Air (J. Clean Air Soc. Australia, New Zealand), 2(3):10-13, Sept. 1968. 9 Refs.

Air pollution measurements in Australia are at present restricted almost solely to deposit gauge and smoke and sulphur dioxide surveys. These are being carried out to an appreciable extent in only three States, viz. New South Wales, Victoria and South Australia. The deposit gauge is considered as a tool for first order of magnitude measurements only. It sould therefore be replaced by instruments, the results from which can be correlated, on a daily basis at least, with meteorological data for the more easy identification of source pollution. Such an instrument is being used by the Shire of Altona in Victoria. (Author's Summary##

3936 APTIC NUMBER 12648

S. F. Galeano
HOW TO DEVELOP AIR SURVEILLANCE PROGRAMS FOR PULP MILLS. Paper Trade J., 153(1):41-43, Jan. 6, 1969. 2 Refs.

Air quality and emission standards are being prepared and implemented by local and state authorities on a continuing basis. Emissions to the atmosphere by pulp and paper mills, as well as other industrial plants, will be governed by these standards. The most meaningful contribution of a paper mill air surveillance program would be in providing data essential to the establishment of realistic air quality standards. With such a program supported by management, a company will be in a position to authoritatively recommend realistic air criteria for the area surrounding a particular manufacturing facility. A substantive surveillance program is outlined.##

3937 APTIC NUMBER 13005

Gibbs, W. J., J. R. Moroney, D. J. Stevens, and E. W. Titterton
FALLOUT OVER AUSTRALIA FROM NUCLEAR WEAPONS TESTED BY FRANCE IN POLYNESIA FROM JULY TO SEPTEMBER, 1968. Aust. J. Sci., 31(11): 383-388, 1968. 16 refs.

The Automic Weapons Test Safety Committee program involving measurements of the total beta activity in daily fallout deposition, I-131 concentration in daily milk samples, and total external gamma radiation is discussed. Results of total beta activity in daily deposition measurements showed that the onset of primary fallout over Australia from an explosion in Polynesia occurs 10 to 15 days afterward and that most of the deposition over Australia of short-lived debris from an explosion is complete within 35 days. Iodine-131, a radioisotope which enters man's diet through milk and is selectively absorbed by the thyroid, is estimated to be consumed at the rate of 200 pCi/L, which is not harmful to health. External gamma radiation doses to the whole body are very small in comparison with annual background radiation.

3938 APTIC NUMBER 13024

Hamamura, M.
AIR POLLUTION IN THE MIZUSHIMA DISTRICT, OKAYAMA PREFECTURE, JAPAN. (Okayama-ken Mizushima-chiku no taiki osen ni tsuite). Text in Japanese. Kuki Seijo (Clean Air-J. Japan Air Cleaning Assoc., Tokyo), 6(6):48-53, 1969.

The air pollution problem of Mizushima, a rapidly growing industrial district, was studied. Mizushima was built along the seashore between the Kosen river and Kojima Peninsula, 4 km in length from east to west, 7 to 8 km from north to south, with a 250 m hill in the eastern region and a 150 m hill in the northern region. The industries of this district are mainly iron manufacturing plants, oil refineries, electric power plants, and petroleum chemistry plants. Weather characteristics around this district are constant. In spring and summer, the predominant wind direction is south-southwest from the shore at daytime, while at night the wind blows in the opposite direction. During the summer, there is a correlation between the direction of wind and the pattern of air pollution in the area. In autumn, when wind from the south is unlikely, air pollution is not usually visible. In winter, a pollution pattern was observed, even when the wind direction was west to north. The amount of falling dust was constant over the period 1965 through 1968. However, SO2 concentration gradually increased 0.37 mg/day/100 sq cm in 1965, and, in 1967, 0.51 mg/day/100 sq cm. the amount of SO2 is increasing during all seasons, but is heavier in summer than in winter. A high correlation was seen between the wind and the amount of SO2. Also, the concentration of SO2 tends to vary with wind direction. Air pollution in this area will increase as a result of increasing usage of heavy oil from 100 KL/H in 1967 to 940 KL/H, and the increase of SO2 from 2,220 cu Nm/H to 18,000 cu Nm/H. Because a pattern of air pollution in this area during the winter has been observed, regulations on industry must be tightened. Also, to protect people, residential and industrial areas should be separated.

3939 APTIC NUMBER 13780

Ingiulla, M., C. Grasso, and E. Mariottini
USE OF HYDROCARBONS LEVEL DETERMINATIONS IN THE STUDY OF AIR POLLUTION. (Ulteriori determinazioni dell'ossido di carbonio quale indice di inquinamento atmosferico). Text in Italian. Igiene Mod. (Parma), 61(9-10):582-591, Sept.-Oct. 1968. 3 refs.

Air pollution in Florence was studied by determining concentration levels of carbon monoxide in 1296 air samples and hydrocarbons in 1188 samples. Samples were taken in busy streets and adjacent shops or apartments. The CO concentrations reached levels as high as 150 ppm outdoors and 50 ppm in a shop, indicating notable air pollution. Hydrocarbon levels were too small to be determined. (Author summary modified)

3940 APTIC NUMBER 13021

Kochi, Shin
AIR POLLUTION IN KEIYO, JAPAN. (Keiyo chitai no taiki-osen ni tsuite). Text in Japanese. Kuki Seijo (Clean Air-J. Japan Air Cleaning Assoc., Tokyo), 6(6):54-60, 1969.

Changes in the amount and types of air pollution in Keiyo, Japan were studied on the basis of data collected by the Hygienic Research Center from 1960 to 1968. The amount of falling dust did not vary with the year, month, or season. There were, however, significant differences among the different areas: the closer to the industrial areas, the higher the concentration; and the higher the ratio of infusibility, the higher the concentration. Although no differences were found in the amount of floating dust between the years, seasonal changes were observed. Two peaks in the concentration also were observed, one around 9:00 am and the second between 6:00 and 8:00 pm. The amount of SO2 measured by the PbO2 method was also studied and found to have increases up to 1965, but to have remained constant since 1965. The cause of this change was undetermined. There were significant differences in the amount of SO2 among the areas. Ichikawa showed an average of 0.71 mg in the downtown area, 1.01 mg in the industrial area, and 1.33 mg in the area closest to Tokyo. Funabashi showed an average of 0.49 mg in the amount of SO2, which, interesting enough, is smaller than the downtown area of Ichikawa. Rapid changes were observed and concentrations differed considerably with the month and season in Chiba and Ichihara. Among these cities, Chiba appears to suffer the worst air pollution.

3941 APTIC NUMBER 13702

Feneny, Etel and E. C. Halliday
SMOKE CONCENTRATIONS IN SOUTH AFRICAN TOWNS. PART IV. DATA FOR OCTOBER, 1966 TO SEPTEMBER, 1968. Public Health, Feb. 1969. 3 refs.

Results of smoke measurements carried out in various South African towns between Oct. 1966 and Sept. 1968 are presented in tabular form. Smoke concentrations are expressed by the Soiling Index which represents the darkening potential of smoke and soot. The sampling sites in the different towns are classified in the four areas: central or office building, industrial, residential, and non-European residential.

3942 APTIC NUMBER 13473

Koeper, Hanns-Joachim
EMISSION LOADING BY SULFUR DIOXIDE IN THE ENVIRONMENT OF A POWER PLANT. (Immissionsbeaufschlagung durch Schwefeldioxid in der Umgebung eines Kraftwerkes.) Text in German. Wasser Luft Betrieb, 12(11):705-708, Nov. 1968. 5 refs.

Beginning in summer 1966, 26 bi-weekly measurements of atmospheric SO2 by the silica gel absorption method were made at 28 stations placed 1 km apart in a square configuration lying within 3 km of a 104 m high smoke stack of a lignite-fired power plant near Hesse. At each station, the wind speed and direction were measured concurrently by a portable anemometer and weather vane. The sets of 728 values each of SO2 content, wind speed, and wind direction measured in the course of one year were used to prepare histograms and the associated cumulative distributions of the former two quantities and a histogram only of the third. In addition, the SO2-content data were used to calculate the emission coefficients for the entire area as well as for individual localized sections. Finally, the statistical dependence of the emission coefficients on the wind speed and the wind direction was studied.

3943 APTIC NUMBER 13176

Merik, J.
DISPERSION OF AIR POLLUTANTS IN THE VICINITY OF VARIOUS INDUSTRIES. (Ausbreitung luftfremder Stoffe in der Umgebung verschiedener Werke). Text in German. Z. Meteorol., 20(1-6): 116-118, 1966.

The Hungarian State Institute for Hygiene conducts regularly scheduled air quality measurements in various industrial centers of Hungary which are located near residential areas. The program was started in 1953 and has been continued ever since. The air pollution concentrations measured near electrical power plants, chemical industries, cement factories, and blast furnaces are listed. The grid measurements are being taken mainly in the residential and rural areas close to these industries with respect to wind direction. It was found that the pollution concentrations reached values which far exceed the permissible limits. The presently valid regulations are considered too lenient. Air pollution control methods within the various industrial plants are urgently needed.

3944 APTIC NUMBER 13138

Moshkin, Victor E.
FALLOUT RADIONUCLIDES AND BERYLLIUM-7 IN OVER-OCEAN AEROSOLS. Tellus, 21(3):414-428, 1969. 19 refs.

Aerosols in surface air over the Atlantic Ocean were collected on air filters for several months during each year from 1964 to 1966. Measurement of the radioactivity in these filters was by gamma-ray spectrometry, and the concentration of various fallout nuclides and Be-7 was determined by computer analysis of the spectra. Results showed fallout radioisotope concentrations equal to or slightly less than the averages for over-land concentrations in the latitude band 0 to 40 deg N. When averaged by 10 deg latitude bands, month to month comparisons show significant differences in fallout concentrations over-ocean from those over-land. Less fallout was found in the 20 to 30 deg N latitude band with a correspondingly higher concentration in the 0 to 10 deg N band. Correlations of Be-7 to Cs-137 suggest that some Be-7 observed in marine aerosols may be stratospherically derived. The conclusion reached from the data was that over-land and over-ocean deposition at the same latitudes are different and are governed by independent meteorological events not necessarily operative on an annual cycle. No fractionation was observed between Cs-137 and Ce-144, in over-land and over-ocean aerosols as a function of latitude. The source for the fallout over-land and over-ocean must be the same well-mixed reservoir. (Author summary modified)

3945 APTIC NUMBER 13106

Ozkaragoz, Kenal
A STUDY OF AIRBORNE FUNGI IN THE ANKARA AREA OF TURKEY IN 1966.
Acta Allergol., 24(2):147-156, May 1969. 5 refs.

Airborne spores are great importance in allergic diseases. A study was undertaken to investigate the prevalence and fluctuation of airborne fungal spores at different altitudes and times of the day. Using the plate culture technique, measurements were taken for ten minutes each day, five days a week, at ground level and at 1.5, 4, and 8 m above the ground at 7 a.m., 10 a.m., 2 p.m., and 5 p.m. for one year (1966). Results showed the most prevalent fungal spores encountered were penicillium, rhizopus-mucor, aspergillus, pullularia, hormodendrum, alternaria, and helminthosporium. Penicillium accounted for 29% of the 6240 colonies isolated and showed marked seasonal variations with the highest concentrations in spring and fall. The highest concentration of fungal spores occurred at 7 a.m. at ground and 1.5 m levels.

3946 APTIC NUMBER 13121

Prietsch, W., E. Hunigen, S. Schindler, and W. Jaskulla
AUTOMOTIVE AIR POLLUTION IN BERLIN, CAPITAL OF EAST GERMANY. PRELIMINARY RESULTS OF MEASUREMENTS IN THE PRENZLAUER BERG DISTRICT. (Über die Luftverunreinigung durch Kraftfahrzeuge in Berlin, Hauptstadt der DDR. Erste Messergebnisse in Bezirk Prenzlauer Berg). Text in German. Z. Ges. Hyg. (Berlin), 15(5): 326-333, May 1969. 30 refs.

Results of a survey on automotive exhaust emissions and meteorological parameters in the Prenzlauer Berg district of Berlin are discussed. Carbon monoxide exceeded the maximum allowable emission value in 45.5% of the 457 half-hour mean values recorded, while all permanent values of CO exceeded this value. Engine exhaust components, CO, NO2, and hydrocarbons showed a typical daily curve with maximum values in the morning and afternoon hours. There is a regularly occurring correlation between NO2 and CO emissions. Carbon monoxide concentrations require immediate reduction, while the NO2 level is believed safe for the present time. (Author summary modified)

3947 APTIC NUMBER 13128

Schuschke, G. and H. D. Schulze
RESULTS OF A 3-YEAR MEASUREMENT PROGRAM FOR DUST SEDIMENTATION IN MAGDEBURG (GERMANY). (Ergebnisse 3 jahriger Sedimentationsstaubmessungen in Magdeburg). Text in German. Z. Ges. Hyg. (Berlin), 15(5):344-348, May 1969. 7 refs.

The results of a 3-year measurement program for dust sedimentation in Magdeburg, Germany are demonstrated as sum frequency (percentage) curves subdivided into four classes. Of the 37 measuring sites, five belonged to class one (12 to 15 g/sq m times 30 days), 11 to class two (16 to 20 g/sq m times 30 days), 13 to class three (21 to 30 g/sq m times 30 days), and eight to class four (31 to 74 g/sq m times 30 days). The hygienic normative value (15 g/sq m times 30 days) was found at only five of the sites, indicating a need for control measures for the entire city. (Author summary modified)

3948 APTIC NUMBER 12644

M. W. Ballard, R. Valenzuela, M. Izquierdo, J. R. Randhava, R. Morla, J. F. Bettie
SOLAR ECLIPSE. TEMPERATURE, WIND, AND OZONE IN THE STRATOSPHERE. J. Geophys. Res., 74(2):711-712, Jan. 15, 1969). 4 ref.

The occurrence of a total eclipse at Tartagal, Argentina, on November 12, 1966, prompted a rocket sounding experiment to determine temperature, wind, and ozone perturbations in the stratosphere caused by the eclipse. Soundings were made in the 65- to 30-km region of the atmosphere before, during, and after the total eclipse. Twelve rockets were successfully fired; nine of the rocket instruments were designed to measure temperature and three were designed to determine ozone concentration in the atmosphere. Wind speed was determined for each sounding from the trajectory of the radar-reflective parachute. (Author's Abstract)##

3949 APTIC NUMBER 12620

Berry, E. X.
A MATHEMATICAL FRAMEWORK FOR CLOUD MODELS. J. Atmospheric Sci., 26(1):109-111, Jan. 1969. 1 Ref.

A mathematical framework is described which allows the logical joining of the processes of condensation, collection and advection, and also freezing and electrical effects in a cloud model. (Author's Abstract)##

3950 APTIC NUMBER 12220

Culkowski, Walter M.
CALCULATIONS OF THE DEPOSITION OF AEROSOLS FROM ELEVATED SOURCES. Weather Bureau, Oak Ridge Operations Office (AEC), Tenn. Research and Development Div., ORO-171, 11p., February 18, 1958. 6 refs.

The usefulness of the Sutton diffusion model in estimating concentrations of atmospheric effluents has recently been extended by Chamberlain who has provided a discussion of the effects of ground deposition. Chamberlain's extension is derived from Sutton's diffusion formulae in which the diffusing puff or plume is assumed to possess a normal distribution of concentrations, having standard deviations in the various coordinate directions that increase downwind from the source. The rate of increase of these standard deviations is dependent upon the total atmospheric turbulence present in the neighborhood of the plume. For the case of a source at ground level, Chamberlain.s treatment of the deposition effect results in an easily evaluated, multiplicative correction to the appropriate Sutton formula. For an elevated source, however, such as a stack or explosion cloud, the Chamberlain deposition formula is fairly complex and not easily evaluated. The following paragraphs describe a simplified computational technique for this purpose, together with several sample deposition calculations. Briefly, Chamberlain's modification is to consider the fraction of particles at the surface level lost by the cloud through deposition.

3951 APTIC NUMBER 12625

W. A. Gault, E. H. Bundle
TWILIGHT OBSERVATIONS OF UPPER ATMOSPHERIC SODIUM, POTASSIUM, LITHIUM. Can J. Phys., 47(1):85-98, Jan. 1, 1969. 29 Ref.

Twilight resonance emissions due to atmospheric sodium, lithium, and potassium have been measured for over one year. The existence of the K resonance line was verified by using an absorption cell. Several problems of measuring the emissions and of subsequently calculating a density distribution are discussed. The widths of about 13 km and the topside scale heights of about 8.5 km obtained for the Na layer are significantly less than obtained at Saskatoon in previous measurements. Atmospheric transmission functions have been recalculated with the results that the Na and Li layers are both at about the same height of around 90 km. A lower height of about 85 km was obtained for the K layer. The seasonal variations of Na and Li twilight abundances are shown to be similar with additional sharp enhancements of Li abundances thought to be due to natural and man-made injections of Li. Any seasonal variations of the K abundances in the lower layer were masked by large day-to-day fluctuations. (Author's Abstract)##

3952 APTIC NUMBER 12626

J. I. Gordon
MODEL FOR A CLEAR ATMOSPHERE. J. Opt. Soc. Am., 59(1):14-18, Jan. 1969. 14 Ref.

A model of a clear atmosphere is presented based upon two assumptions: (1) The point-function equilibrium radiance for a given path of sight does not change with altitude; (2) there is no absorption. As a result of these assumptions, the equation of transfer can be integrated. The path radiance for any slant path becomes a function of the equilibrium radiance and the beam transmittance of that path. /In addition, the equilibrium radiance is a function of the scalar irradiance from the sun, sky, and earth and the proportional directional scattering coefficient for ground level. Sky radiances, and path radiances through the atmosphere for both upward and downward paths are determined by four parameters; the proportional directional scattering function for ground level, the total vertical beam transmittance of the atmosphere, the scalar albedo, and the solar zenith angle. There is evidence that the real atmosphere does on some days conform to the above two assumptions to a useful extent for the visible portion of the spectrum. (Author's Abstract)##

Preceding page blank

3953 APTIC NUMBER 13030

Harada, Akira
A METEOROLOGICAL ANALYSIS OF SO2 POLLUTION IN SUMMER IN OSAKA. (Osaka ni okeru natsu no aryusan-gas osen no kishyogaku-teki kaiseki rei). Text in Japanese. Kishocho Kenkyu Jiho (J. Meteorol. Res.), 21(1):37-40, Jan. 1969. 3 refs.

The concentration of SO2 pollution in Osaka was measured on July 15, 1966. Data were collected at 16 locations and meteorologically analyzed. The highest concentration of SO2 pollution was observed between 9 am and 1 pm. The heavy concentration during that period was caused by a build up from polluted sea wind followed by a similarly polluted land wind. It was apparent, therefore, that heavy SO2 pollution can be produced in summer despite the low stability of air pressures.

3954 APTIC NUMBER 12627

B. M. Herman, D. M. Yarger
ESTIMATING THE VERTICAL ATMOSPHERIC OZONE DISTRIBUTION BY INVERTING THE RADIATIVE TRANSFER EQUATION FOR PURE MOLECULAR SCATTERING. J. Atmospheric Sci., 26(1):153-162, Jan. 1969. 18 Ref.

A method of estimating the vertical distribution of ozone by inverting the equation of radiative transfer is presented. The method allows for all orders of scattering as well as polarization of the diffusely reflected sunlight. The information content of the reflected sunlight as a function of observation angle is examined for the case where perfect measurements are assumed, and also for the case where a 1% random error is introduced into the measurements. Inversion results utilizing simulated satellite measurements are presented for several different ozone soundings. (Author's Abstract)##

3955 APTIC NUMBER 12654

M. Hino
COMPUTER EXPERIMENT ON SMOKE DIFFUSION OVER A COMPLICATED TOPOGRAPHY. Atmos. Environ., 2(6):541-558, Nov. 1968. 18 Refs.

A technique of numerical experiments on smoke diffusion over a complicated topography by means of a high-speed digital computer is developed. The technique consists of the computation of field of wind velocity from the dynamic equations of fluid motion, and then solving the Fickian equation of diffusion to obtain the distribution of smoke concentration. Comparison of the computed distribution with some model results suggests that the method of computer experiments is as reliable as, or more reliable than, the conventional wind-tunnel experiments for the estimation of the distributions of wind velocity and smoke concentration over the area with complex topographical features. (Author's Abstract)##

3956 APTIC NUMBER 12628

P. V. Hobbs, L. F. Radke
CLOUD CONDENSATION NUCLEI FROM A SIMULATED FOREST FIRE. Science, 163(3864):279-280, Jan. 10, 1969. 7 Ref.

Measurements made downwind of a simulated forest fire showed that the concentration of cloud condensation nuclei active at a supersaturation of 1 percent was increased by a factor of about 2.5. Smaller increases were observed at lower supersaturations. (Author's Abstract)##

3957 APTIC NUMBER 12632

J. J. Kelley, Jr.
INVESTIGATIONS OF ATMOSPHERIC TRACE GASES AND SUSPENDED PARTICULATE MATTER ON MOUNT OLYMPUS, WASHINGTON. J. Geophys. Res. 74 (2), 435-43 (Jan. 15, 1969). 11 Ref.

Atmospheric CO2, water vapor, net oxidant, and suspended particulate matter were measured at the Blue glacier field station, Mount Olympus, Washington, during the summer of 1966. Diurnal variations of CO2, net oxidant, and water vapor are related to mountain and valley wind transport. Diurnal variations of CO2 and net oxidant have a phase nearly opposite to the typical diurnal variations in the rural lowlands. Concentrations of suspended particulate matter are lower than the concentrations of the urban and industrial areas of the Puget Sound region but generally follow the fluctuations of lowland concentrations. (Author's Abstract)##

3958 APTIC NUMBER 12948

Kurashiki Rayon Ind. Co.
DISTRIBUTION AND FLUCTUATION OF SULFUR-OXIDE CONCENTRATION BY FLUE GASES DISCHARGED FROM BOILER. (Boira haiga ni yoru io sankabutsu no nodobunpu to hendo ni tsuite). Text in Japanese. Netsu Kanri (Heat Engineering, Tokyo), 21(4):16-20, April 1969.

Sulfur dioxide is the main harmful gas discharged from the boilers of the Kurashiki Rayon Industrial Co. in Okayama, Japan. A 90-meter-high chimney, which has an effective outlet internal diam of 2.040 m, ejects exhaust gas at the rate of 131,400 N cu m per hour, including 188 N cu m per hour of SO2. Over all seasons, wind velocity ranged from 0 to 3.3 m/sec 83 to 92% of the time, and from 3.4 to 7.9 m/sec 6 to 17% of the time. From 1959 to 1969, the average wind velocity was 2.1 m/sec, in spring and winter 1.9 m/sec in summer, and 1.6 m/sec in fall. In winter, the prevailing wind is from the east, resulting in a maximum concentration of sulfur oxides after dispersion into the air of 0.0100 ppm and an average concentration of 0.002 to 0.0075 ppm. This is far lower than the upper limit of harmful concentration. The area of air pollution is 7 to 30 kilometers downwind from the chimney. The concentration of sulfur oxides

can be reduced by adding greater quantities of combustion air to the boiler, increasing the exhaust gas temperature, increasing the effective height of the chimney, or decreasing the crude petroleum/coal ratio.

3959 APTIC NUMBER 12634

C. B. Leovy
ATMOSPHERIC OZONE. AN ANALYTIC MODEL FOR PHOTOCHEMISTRY IN THE PRESENCE OF WATER VAPOR. J. Geophys. Res., 74(2):417-426, Jan. 15, 1969. 22 Ref.

An approximate analytic model of stet photochemistry including reactions with hydrogen compounds is developed for the atmospheric region between 15 and 60 km. The reaction scheme is a simplified version of that used by B. G. Hunt. The model is used to study time-dependent processes, the sensitivity of the equilibrium-concentration values to uncertainties in reaction rates, and the variations in the equilibrium ozone concentration with latitude and season. There are five main results. (1) O3 loss in the model depends on the ratio of the rate of production of O(1D) and the rate of dissociation of H2O by O(1D), but the loss rate and equilibrium O3 concentration are not very sensitive to this ratio. (2) Below 40 km the model is quite sensitive to the rates of reaction of O3 with OH and HO2; these unknown reaction rates are the weakest link in the theory. (3) Above 40 km the relevant reaction rates are comparatively certain and the O3 concentration is very likely to be controlled by reactions of atomic oxygen with OH and HO2. (4) As a consequence of (3), the O3 concentration near the stratopause is probably not sensitive to temperature, and the dynamical damping sometimes attributed to this temperature sensitivity is likely to be unimportant. (5) If the model is correct, the photochemical time scale for O3 is much less than it would be if only O2 reactions control O3; consequently, in low latitudes, O3 may be subject to significant photochemical influence down to as low as 15 km. (Author's Abstract) 07

3960 APTIC NUMBER 13920

Reiter, Reinhold
UPWARD FLUX OF RAB AND RAC IN THE PLANETARY BOUNDARY LAYER AS CONTROLLED BY ATMOSPHERIC MICROSTRUCTURE. Pure Appl. Geophys. (Basel), 72(1):247-258, 1969. 9 refs. (Presented at the 14th General Assembly of the IUGG, meeting of the ICACR, Lucerne, Switzerland, Oct. 1967.)

Seasonal variations of natural radioactivity and the mechanism of tropospheric exchange, as related to aerosol structure, were determined with data obtained by synchronous measurements of RaB and RaC concentrations in the ambient air at mountain stations located at 730, 1780, and 3000 meters above sea level (m.s.l.). The use of RaB as the tracer for radon permitted the calculation of the vertical exchange coefficient and/or the eddy diffusion coefficient from measured values of the vertical concentration gradients. In the summer, strong exchange reaching to high altitudes caused an almost complete equalization of RaB and RaC concentrations. Stable stratification developed below 1800 m a.m.s.l., and the natural radioactivity originally carried to 3000 m a.m.s.l. was replaced with air of much lower activity; a rapid decrease of RaB concentrations occurred in the layer between these levels. In winter there was a virtually complete inhibition of exchange. Extremely high RaB values were recorded at 700 m a.m.s.l., and extremely low ones at 3000 m a.m.s.l. The relative values of instability energy were calculated and correlated with vertical exchange coefficient for the layer between 700 and 1800 m a.m.s.l. The result shows a logarithmic relation between instability energy and exchange coefficient. Separate determinations of RaB and RaC indicated that the weaker the intensity of change, the closer the radioactive equilibrium between the elements. Statistical studies show that the largest part of the naturally radioactive aerosols found at mountain levels originate at valley levels.

3961 APTIC NUMBER 12525

Stuiver, M.
OXYGEN-18 CONTENT OF ATMOSPHERIC PRECIPITATION DURING LAST 11,000 YEARS IN THE GREAT LAKES REGION. Science, 162(3857): 994-997, Nov. 29, 1968. 16 refs.

Freshwater lake marl and mollusks from Indiana show variations in ratios of oxygen-18 to oxygen-16 of a few per mil during the Postglacial. For the last 9000 years these variations are about 1 per mil for properly selected lake sediments. Thus the oxygen isotope composition of atmospheric precipitation appears relatively stable over this interval, indicating stationary atmospheric circulation patterns over the Great Lakes region. A reduction in oxygen-18 content around 10,000 years ago corresponds with the climate change indicated by pollen profiles. Large systematic differences were found between carbon-13 and oxygen-18 content of marl and mollusks. (Author's abstract) 08

3962 APTIC NUMBER 13391

Aarvik, Jon
CATALYST FOR THE REACTION BETWEEN HYDROCARBONS AND SULFUR DIOXIDE FOR THE PREPARATION OF PURE SULFUR. (Norg. Geol. Undersokelse Trondheim, Norway) U. S. Pat. 3,369,872. 1p., Feb. 20, 1968. 3 refs. (Appl. Aug. 10, 1965, 1 claim.)

Carbon formation can essentially be eliminated in the reduction of sulfur dioxide with hydrocarbons such as mineral oil by the use of a cordierite catalyst or other material with uniformly sized pore of molecular dimensions. Sulfur dioxide is contacted with the mineral oil and catalyst at 800 to 1300 C to produce sulfur and reaction gases free of carbon. Sulfur dioxide and H2S occur in a 1:2 ratio. The SO2 and H2S may be reacted to form more sulfur.

3963 APTIC NUMBER 13896

Adadurov, I. Ye.
ADSORPTION PHENOMENA OCCURRING ON THE SURFACE OF STANNOZEOLITE CATALYST. (Yavleniya adsorbtsii, proiskhodyashchiye na poverkhnosti stannotseolitvogo katalizatora). Text in Russian. Zh. Prikl. Khim., 3(6):833-842, 1930. 11 refs.

Adsorption of oxygen from air by vanadium stannozeolite was studied to elucidate the mechanism of SO3 formation during adsorption of SO2 and O2. It was concluded that: oxygen is not adsorbed from an air-gas mixture; sulfur dioxide is adsorbed in direct relation to the presence of moisture; and this adsorption leads to reduction of V(V) and V(III); adsorption of SO2 ceases after 97-99% of the vanadium has been converted; SO3 is adsorbed by the contact mass, implying equimolecular removal of oxygen from the gas mixture; gas flow rate does not affect contact efficiency, indicating that the contact process takes place away from the catalyst surface.

3964 APTIC NUMBER 13392

Addison, W. E. and R. M. Barrer
SORPTION AND REACTIVITY OF NITROUS OXIDE AND NITRIC OXIDE IN CRYSTALLINE AND AMORPHOUS SILICEOUS SORBENTS. J. Chem. Soc., Part 1, p. 757-769, 1955.

Zeolite-induced reaction processes occurring in an intracrystalline environment were investigated by observing the sorption and reactivity of nitrous and nitric oxide in crystalline sorbents (chabazite, mordenite, faujasite and the synthetic zeolite Na-A) and amorphous sorbents (porous glass, Doucil, and silica gel). All sorbents were outgassed for 24 hr at indicated temperatures, and first characterized and compared by a study of oxygen and argon sorption. The affinity between oxygen and the sorbent varied according to the cation present. Nitrous oxide was sorbed much more strongly than oxygen or argon so its sorption was studied between -78 and 350 K. Both chabazite and mordenite were effective in bringing about the reaction 4NO equals N2O3, but intracrystalline nitrate and nitrite reduced the sorption activity of chabazite. Disproportionation of sorbed nitric oxide was noted in the reactivity of sorbed nitric oxide towards oxygen. Findings indicate striking differences between zeolites acting as disproportionation catalysts and the relatively feeble catalysts observed with siliceous gel sorbents. It was concluded that an intracrystalline environment promotes reactivity.

3965 APTIC NUMBER 13223

Adrussow, Leonid
THE CATALYTIC NITRIC OXIDE REDUCTION AND AMMONIA OXIDATION (IV). (Über die katalytische Stickoxyd-Reduktion und Ammoniak-Oxydation (IV)). Text in German. Chem. Ber., vol. 60:536-540, 1927. 13 refs.

For further clarification of the ammonia oxidation which was studied in three earlier works, it seemed desirable to also study the reverse process, i.e., the reduction of nitric oxide to ammonia. For this purpose, a mixture of nitric oxide and hydrogen was passed with constant speed over a Pt screen catalyst. After a period of 50 to 80 min required to establish equilibrium, the vessels for the analysis were connected. Ammonia was absorbed by distilled water in the apparatus and a constant flow of oxygen for oxidation to NO was added. The nitric oxides thus obtained were absorbed in sodium hydroxide and frozen with liquid air. Compared to the rapid oxidation of ammonia, the effect of molecular hydrogen on nitric oxide with a platinum catalyst is rather sluggish even at contact times 1000 times as long. Even at the high temperature of 850 C, half of the nitric oxide passed the catalyst without dissociation. Prolonging the contact period from 0.001 sec to 0.006 and 0.003 sec lead to a 90% reduction of the nitric oxide. Between 600 and 650 C, a considerable amount of nitrogen formed, due to the dissociation of ammonia product. Without a catalyst, the effect of hydrogen on nitric oxide remains sluggish even at high temperatures.

3966 APTIC NUMBER 13882

Airey, E. M.
GAS EMISSION FROM BROKEN COAL. AN EXPERIMENTAL AND THEORETICAL INVESTIGATION. Int. J. Rock Mech. Min. Sci., 5(6):475-494, Nov. 1968. 7 refs.

Deep soft seam coal from the Sherwood Colliery ranges in size between 0.5 in. and 200 mesh was brought into equilibrium with methane at pressures of 50, 150, and 300 psi. One empirical formula with only three constants was developed to describe the rate of degassing observed for all the sizes, pressures, and moisture contents tested. Errors in the empirical formula were very small. A theory based on gas flow through a homogeneous solid is shown to give poor agreement with experimental results. A theory incorporating a mathematical model including a crack system is shown to be compatible with the empirical equation.

Preceding page blank

3967 APTIC NUMBER 13072

Akamatsu, Isao and Hiroshi Kanishima
DEODORIZATION OF EXHAUST GAS IN KRAFT PULPING. 2. ON THE DEODORIZATION ACCORDING TO THE ADSORPTION AND ABSORPTION. (Kurafuto parupu seizo kotei haisui gasu no mushuka (dai nifo). Kyuchaku oyobi kyushu ni yoru akushu seibun no jokyo ni kansuru kisoteki kenkyu). Text in Japanese. Kami-pa Gikyoshi (J. Japan Tech. Assoc. Pulp Paper Ind.), 23(6):25-30, June 1969. 16 refs.

Adsorption and absorption capacities for malodorous components were estimated at 20 and 29 C. The adsorption capacity of activated carbon for methyl mercaptan was larger than that for dimethyl sulfide. For the hydrogen sulfide, activated carbon acted not only as an adsorbent but also as a catalyst, so adsorption capacity of activated carbon for hydrogen sulfide was larger than that for the other sulfur compounds. When a mixture of dimethyl sulfide and methyl mercaptan was adsorbed on activated carbon, the total adsorption capacity of activated carbon was a medium capacity between those for individual components. Because real kraft pulp blow gas is a mixture of methyl mercaptan, dimethyl sulfide and others, the adsorption of activated carbon for one was the mixture adsorption, and the adsorption capacity was 30 to 40%. The absorption capacity of polyvinyl chloride for dimethyl sulfide was moderately large, but dimethyl sulfide in air was absorbed only partially. The absorption reaction of ferric oxide for hydrogen sulfide resulted in water as a reaction product, therefore exact measurement of absorption was difficult. (Author abstract modified)

3968 APTIC NUMBER 13199

Aldrich, Lyman C.
KRAFT COOKING LIQUOR PREPARED FROM LIQUID SODIUM HYDROSULFIDE AND CAUSTIC SODA. Southern Pulp Paper Mfr., 30(6):74-75, 78-80, June 10, 1967.

Liquid sodium hydrosulfide and liquid caustic soda are the active chemicals in a synthetic white cooking liquor that can be used to fill the system for the initial start-up of new kraft pulp mills. The two chemicals react to form sodium sulfide which, together with caustic soda, separates lignin from wood fibers. The synthetic liquor can be prepared from 45% sodium hydrosulfide and 50% caustic soda, using the normal kraft mill recovery equipment. Because the large volumes of synthetic cooking liquor for start-up are prepared only once, no more than minimal extra equipment is needed. Because both sodium hydrosulfide and caustic soda produce severe burns, personnel involved in the unloading and mixing operations should use shields and protective rubber equipment. Since there is less generation of H2S at high pH values, the sodium hydrosulfide should be mixed with dilute caustic soda as soon as possible. Synthetic cooking liquor will have the same concentration of H2S as is found in a kraft mill operating with regular cooking liquor. Therefore, standard kraft mill ventilation and safety precautions are sufficient.

3969 APTIC NUMBER 13280

Anderson, Jan M. and S. W. Thorne
THE FLUORESCENCE PROPERTIES OF MANGANESE-DEFICIENT SPINACH CHLOROPLASTS. Biochim. Biophys. Acta, 162(1):122-134, July 1968. 38 refs.

The role of the micronutrient Mn in the primary reactions of Photosystem 2 was investigated. The fluorescence properties of chloroplasts isolated from Mn-deficient spinach plants and chloroplasts isolated from nondeficient plants of the same age were examined at 20 C and 77 K, using light of weak intensities for excitation. At 20 C, regardless of the excitation wavelength used, the Mn-deficient chloroplasts were more fluorescent than the control chloroplasts; at 77 K the position was reversed. A comparison of the induction of fluorescence intensity at 20 C showed that the increase from the initial fluorescence to the final steady-state was lower for the Mn-deficient chloroplasts. Moreover, they showed a faster induction rate. The fluorescence yield of Mn-deficient chloroplasts in the presence of a Hill oxidant were comparable; with the control chloroplasts the fluorescence yield was lower under oxidizing conditions. At 77 K, Mn-deficient chloroplasts did no possess the 693 millimicron fluorescence emission band. Some 80% of the total fluorescence was emitted at 735 millimicrons for the Mn-deficient chloroplasts as compared to 70% for the control. Inhibition of control chloroplasts with 3-(3,4-dichlorophenyl)-1, 1-dimethylurea resulted in a decrease in fluorescence emission at both 683 and 693 millimicrons relative to the emission at 735 millimicrons. Results suggest that Mn deficiency causes a block between the primary and secondary reductants of Photosystem 2.

3970 APTIC NUMBER 13641

Anisimov, B. V. and L. V. Serova
THE EFFECT OF DEIONIZED AIR UPON THE ORGANISM. (O vliyanii na organizm deionizirovannogo vozdukha). Text in Russian. Vestn. Akad. Med. Nauk SSSR (Moscow), 24(3):40-43, 1969. 6 refs.

The pathogenic action of deionized air was not observed among albino mice kept for one month in a chamber ventilated with fully deionized air. Deionized air affected neither the normal growth and development of the mice nor the general condition, behavior, and chemistry of their peripheral blood. A slightly reduced tissue resistance was noted. The data obtained do not support the conclusions of A. L. Chizhevsky that animals will die following two to three week's exposure to deionized air. (Author summary modified)

3971 APTIC NUMBER 13238

Annergren, Goran, Ake Backlund, Johan Richter, and Sven Rydholm
CONTINUOUS PREHYDROLYSIS-KRAFT COOKING. Tappi, 48(7):52A-56A, July 1965. (Presented at the 50th Annual Meeting, Tech. Assoc. of the Pulp and Paper Industry, New York, Feb. 21-25, 1965).

Continuous prehydrolysis-kraft cooking was tried on a semicommercial scale in Kamyr digesters of different designs. Extensive trials with a two-body upflow-downflow digester and a conventional downflow digester indicated that the two cooking stages could be effectively separated in both systems and that a pulp of satisfactory quality could be produced. Deposition of pitch on strainers and heat exchangers with liquor phase prehydrolysis, however, caused operational problems and limited the time of trouble-free operation. A successful operation was finally achieved in a downflow digester where an inclined external top separator replaced the conventional one. This allowed operation of the prehydrolysis stage in vapor phase, which eliminated the pitch problem and also gave other advantages. The kraft cook is carried out in liquor phase, the liquor level forming the point of transition between the prehydrolysis and the kraft cooking stages. The kraft cook is preferably performed countercurrently and is followed by Hi-Heat washing. The system was tested in continuous operation for one month and found to be reliable, simple, and to give a good and uniform pulp quality, i.e., with little screenings, high alpha-cellulose content, and small variations in degree of polymerization and purity. (Author abstract modified)

3972 APTIC NUMBER 13362

Annergren, Goran and Ake Backlund
CONTINUOUS SULPHITE COOKING. Pulp Paper Mag. Can., 67(4):T220-T224, April 1966. 8 refs.

Continuous sulfite cooking has been studied at the Billerud Experimental Pulp Mill in Sweden. The cooking trials were carried out in downflow Kamyr digesters of two different designs. A conventional Kamyr digester was used with good results for continuous cooking of high-yield bisulfite pulp. In the cooking of bleachable-grade bisulfite pulp, however, the decomposition of the cooking chemicals accelerated and a 'burnt' cook resulted. The uncontrolled decomposition was probably caused by thermal liquor flows in the digester. A modification of the digester, to a system incorporating an inclined top separator and carrying full cooking temperature at the top, eliminated the thermal flows and thereby the risk for uncontrolled cooking-liquor decomposition. The new digester system has successfully been used for continuous cooking of bleachable-grade bisulfite pulps on softwoods as well as hardwoods. It has also proved to be well suited for a two-stage sulfite process with a neutral first stage and an acid second stage, as well as a modified soluble-base, acid sulfite process for rayon-grade pulps. Typical operating conditions and pulp quality data are reported. (Author abstract modified)

3973 APTIC NUMBER 13540

Applebaum, David, Paul Harteck, and Robert R. Reeves
THE CHEMILUMINESCENT NO--O-ATOM REACTION. Photochem. Photobiol., 4(6):1003-1006, 1965. 8 refs.

New experimental data gave further information on the mechanism for the chemiluminescent NO--O-Atom reaction. Results were obtained for the change of emission intensities from 10 to 300 microns pressure. Some studies were also made on the effects of Ar, CO2, He, H2O, O2, and CF4 as third bodies. The results support a simple two body recombination for the mechanism of light emission: NO plus O equals NO2 plus energy.

3974 APTIC NUMBER 13293

Arakawa, Yasuo and Yoshio Tanaka
NEW DEVELOPMENTS IN METHODS OF FORECASTING DEMAND FOR ENERGY. Preprint, World Power Conference, General Report, Section IA. (Presented at the Tokyo Sectional Meeting, World Power Conference, p. 185-191, Oct. 16-20, 1966).

The methods employed by 26 countries in forecasting demands for energy and electric power were evaluated. Two basic methods of forecasting are common to many countries: (1) the econometric method of estimating demands by sectors and regions and (2) the trend method for extrapolating the rate of demand increases in time series. Developing countries often forecast future demand in the light of past growth of advanced countries. Few countries consider the limitations of demand forecasts based on statistical hypotheses; many fail to recognize changes in patterns caused by technological innovations. It is hoped that demand analysts will discuss these points as well as methods of forecasting load curves and estimating repressed demands caused by power shortages.

3975 APTIC NUMBER 13679

Araten, D.
SOME MOLTEN IONIC OXIDES AS CHEMICAL REAGENTS. J. Appl. Chem. (London), 18(4):118-121, 1968.

Molten ionic oxides possess important desirable properties: thermal stability, and useful chemical properties resulting from their acid or basic behavior, and, in several cases, relatively low melting points, well below 1000 C. Bismuth trioxide was found to effect a two-temperature decomposition of ammonium chloride, yielding ammonia and hydrogen chloride. Molten antimony trioxide was found to attack rock phosphate and convert part of the phosphate to a water-soluble form. Molten lead monoxide was found to dissolve calcium oxide readily, to dissolve chromic sesquioxide, to decompose chromite ore and to permit an extraction of iron-free lead chromate into an upper layer of molten alkali chloride. Addition of lead sulfide to a lead monoxide melt caused formation of elemental lead and lead sulfate. Vanadium pentoxide was found to decompose ammonium chloride, yielding first, hydrogen chloride and then, ammonia. The reaction of a vanadium pentoxide melt with rock phosphate, studied in some detail, resulted in water-solubilization of the phosphate. The product formed in the melt is probably a calcium phosphate vanadate, from the aqueous solution of which calcium can be precipitated by ammonium carbonate: the ensuing ammonium

phosphate and vanadate solution can be separated by known methods, permitting recovery of the vanadium pentoxide, and yielding ammonium phosphate. (Author abstract modified)

3976 APTIC NUMBER 13664

Artamonov, V. S.
THE INFLUENCE OF COPPER AND MANGANESE ON CERTAIN INDICES OF PHOSPHORUS-CALCIUM METABOLISM IN PREGNANT WOMEN AND PUERPERANTS. (Vliyaniye medi i margantsa na nekotoryye pokazateli fosforno-kal'tsiyevogo obmena u beremennykh i rozhenits). Text in Russian. Akusherstvo i Ginekol. (Moscow), 42(4):34-40, 1966. 33 refs.

The diets of pregnant women were enriched with 2 mg/ml each of copper and manganese beginning with the 36th-37th week of pregnancy. The supplements were given in the spring, when there are fewer trace elements in the natural diet. There were increases in the content of total calcium of blood serum and total phosphorus of the 36 women in the experimental group when compared with levels in the blood of 18 women in a control group who did not receive the copper and manganese supplement. This increase was also observed in parturients in the third stage of labor. Serum inorganic phosphate and serum alkaline phosphatase, copper, and manganese concentrations in whole blood decreased under the influence of copper and manganese supplements. Enrichment of the diet of these women reduced blood loss during labor and shortened its duration.

3977 APTIC NUMBER 13872

Arvia, A. J., A. J. Calandra, and H. A. Videla
KINETICS OF OXYGEN FORMATION AND DISSOLUTION ON PLATINUM ELECTRODES IN THE ELECTROLYSIS OF MOLTEN POTASSIUM BISULPHATE. Electrochim. Acta, 13(2):167-182, Feb. 1968. 33 refs.

A study of electrochemical formation and dissolution of oxygen in the temperature range 230-330 C results in the potentiostatic and galvanostatic polarization curves at high overvoltages fitting a Tafel equation. The anodic slope is RT/F and the cathodic slope RT/2F. At low anodic overvoltages, oxide-film formation seems to occur on the platinum. In the cathodic overvoltage region, dissolution of oxygen occurs with a well-defined limiting current related to the amount of oxygen dissolved in the melt. Non-steady measurements for the anodic reaction yield kinetic parameters which coincide with those obtained from polarization curves. Experimental capacitances have reasonably low values. Anodic results are discussed in terms of the discharge of sulphate or bisulphate ions on a totally oxidized platinum surface, the rate-determining step being a two-electron transfer. The cathodic reactions comprise a diffusion process related to oxygen dissolution and the already known electrochemical formation of hydrogen. (Author abstract modified)

3978 APTIC NUMBER 13226

Asbell, Mary Ann and N. G. Eagon
THE ROLE OF MULTIVALENT CATIONS IN THE ORGANIZATION AND STRUCTURE OF BACTERIAL CELL WALLS. Biochem. Biophys. Res. Commun., 22(6):668-671, 1966. 11 refs.

Microscopic examination of cells of Pseudomonas aeruginosa incubated with ethylenediaminetetraacetic acid (EDTA) or with EDTA plus lysozyme in a hypertonic sucrose solution revealed rod-shaped bacilli indistinguishable from normal cells. These bacilli could be restored to osmotically stable forms by the addition of multivalent cations. It was found that these restored cells were not able to multiply extensively, as evidenced by their failure to form colonies. The highest percentage of survivors was noted when a mixture of Ca(2+), Mg(2+), and Zn(2+) in the same ratio as found in the cell wall was used to restore the bacilli. Also, the restored cells took up oxygen at slower rates and to a lesser extent than did normal cells. It is believed that the lipopolysaccharide component of the cell wall of P. aeruginosa was liberated as subunits by EDTA. Since reaggregation was shown to occur in the presence of divalent cations, the lipopolysaccharide may be composed of subunits crosslinked via divalent cations. A mechanism for the synthesis of the lipopolysaccharide sacculus was proposed.

3979 APTIC NUMBER 13341

Ashmore, P. G. and M. P. Levitt
THERMAL DECOMPOSITION OF NITROGEN DIOXIDE. Rev. Correspondence, 9(6):S25-S26, June 1956. 3 refs.

Unusually high initial rates were observed for the thermal decomposition of nitrogen dioxide at low pressures near deg C. The decomposition reaction followed second order kinetics and therefore the graph of 1/NO2 against time should be linear. With runs at higher pressures, however, the slope reached a constant value rapidly. This non-linearity was completely suppressed by the addition of an equal pressure of nitric oxide. Nitrogen did not have the same effect, even at pressures up to 0.5 atm. A reaction scheme involving the NO3 radical was suggested to explain these results.

3980 APTIC NUMBER 13680

Atroshchenko, V. I., V. M. Kaut
KINETICS OF NITROGEN OXIDE ABSORPTION BY CONCENTRATED NITRIC ACID. (Kinetika poglosheheniya okislov azota kontsentrirovannoy azotnoy kislotoy). Text in Russian. Zh. Prikl. Khim., vol.31: 352-360, 1958. 11 refs.

New experimental data regarding the kinetics of absorption of nitrogen oxides by concentrated nitric acid are presented. Dependencies between the absorption rate coefficient and basic physicochemical factors such as NO2 and N2O concentration in the

gas phase, content of nitrogen oxides in the gas, HNO3 concentration in the acid, N2O4 content of the solution, and temperature are established. A dependence between absorption rate coefficients and basic hydrodynamic factors is demonstrated.

3981 APTIC NUMBER 13440

Aurell, Ronnie
INCREASING KRAFT PULP YIELD BY REDEPOSITION OF HEMICELLULOSES. Tappi, 48(2):80-84, Feb. 1965. 10 refs. (Presented at the Alkaline Pulping Conference, Atlanta, Ga., Oct. 28-30, 1964.)

During a kraft cook about 25% by weight of wood carbohydrates is lost. In a birch kraft cook the concentration of dissolved hemicelluloses in the cooking liquor reaches a maximum. Part of these hemicelluloses is subsequently regained by redeposition on the wood fibers; the major portion, however, is degraded in the cooking liquor and lost. By drawing off the cooking liquor at a time when the concentration of dissolved hemicellulose is high, completing the cook in the vapor phase (or by injecting alkali), and then returning the drawnoff liquor to the delignified chips to create suitable conditions for redeposition, it was possible to increase the total pulp yield. The redeposition is favored by a moderate lowering of the pH. By the use of liquor transfer a yield about 1% higher than the normal was obtained for birch cooks with an effective alkali charge of 17.5%. At higher charges the effect was more pronounced, a 1.5-2% higher yield being obtained with 22.5% effective alkali. For pine the same method gave no significant increase in the pulp yield, probably because there is a smaller amount of dissolved hemicellulcses in the cooking liquor. (Author's abstract modified)

3982 APTIC NUMBER 13444

Aurell, Ronnie and Nils Hartler
SULFATE COOKING WITH THE ADDITION OF REDUCING AGENTS. PART III. THE EFFECT OF ADDED SODIUM BOROHYDRIDE. Tappi, 46(4):209-215, April 1963. 36 refs.

The addition of sodium borohydride in pine kraft cooking resulted in a substantially increased yield. The consequences of the borohydride treatment are discussed. When the sulfate cook is preceded by prehydrolysis of the pinewood, the carbohydrates are extensively degraded and dissolved in the alkaline stage. The addition of sodium borohydride will diminish the degradation considerably. The importance of the alkali concentration to the yield in kraft pulping of birchwood is examined. The addition of sodium borohydride without lowering the charge of alkali will result in only a small gain. On lowering the charge of alkali correspondingly, the effect of the addition is considerable. Potassium borohydride had the same effect as sodium borohydride. The reduction with amineboranes was studied. Their effect was less than that of the borohydride. The effect of the borohydride was not changed by the addition of black liquor. The addition of a wetting agent, in order to improve the penetration and thereby the efficiency of the borohydride, gave no improvement. Little advantage was gained upon addition of EDTA in order to improve the stability of the borohydride. Sodium metaborate or tetraborate (borax), added to the cooking liquor, gave no gain. The same result was obtained on the addition of barium or calcium salts. Upon the pretreatment of pine chips with an alkaline solution of sodium borohydride, an increase in yield of 12-13 kg pulp per kg sodium borohydride resulted from the subsequent kraft cook. This is approximately twice as much as if the addition was made directly to the cooking liquor. Different conditions for the pretreatment were studied. The optimum conditions were 80 C, 1% NaBH4 calculated on the wood, a liquor:wood ratio of 5, and 30 min treatment time. An applied pressure further improved the result. The use of borohydride in technical kraft cooking is, however, not economically practical. (Author abstract modified)

3983 APTIC NUMBER 13347

Aurell, Ronnie
THE EFFECT OF LOWERED PH AT THE END OF BIRCH KRAFT COOKS. Svensk Papperstid. (Stockholm), 66(11):437-442, 1963. 12 refs.

For kraft cooking of birch, a certain increase in pulp yield could be obtained at high alkalinity - 22.5% effective alkali - without lignin sorption, by a moderate lowering of the pH at the end of the cook. This increase in yield was 1 - 1.5% based on wood. At lower alkalinity - 17.5% effective alkali - no effect was obtained. If the delignified chips and the black liquor were cooled together approximately 1% higher yield was obtained at the higher alkalinity compared with hot drawing-off of the black liquor. At lower alkalinity this effect could not be obtained. Carbohydrate analyses on the pulps indicated that the yield increase mainly consisted of xylan. As long as lignin sorption did not take place the brightness of the pulp was not affected. There could not be established any differences in beating and strength properties. (Author abstract)

3984 APTIC NUMBER 13010

Aurell, Ronnie and Nils Hartler
KRAFT PULPING OF PINE. I. THE CHANGES IN THE COMPOSITION OF THE WOOD RESIDUE DURING THE COOKING PROCESS. Svensk Papperstid., 68(3):59-68, Feb. 1965. 48 refs.

The changes in the chemical composition of the wood residue during kraft cooking of pine wood were followed for 15.75 and 25%, charges of effective alkali with and without the addition of 0.5% sodium borohydride. At temperatures below 100 C, 30-40% of the alkali charge was consumed in the initial phase of the cook. The removal of lignin and carbohydrates was small during this phase. Between 100 and 150 C, apart from the addition of borohydride, there was only an insignificant decrease in the xylan yield. Without addition of borohydride, 70% of the original amount of glucomannan disappeared from the solid phase whereas an addition of borchydride resulted in a considerably smaller loss of glucomannan. Lignin removal predominated at temperatures higher than 140-150 C. By the

time the maximum temperature, 170 C, was reached, 50% of the lignin had gone into solution. At the maximum temperature, the removal of xylan as well as that of glucomannan was gradually retarded and the residual amounts became comparatively stable. This was also applicable to lignin, even if less pronounced. The chief difference between the 15.75% and 25% charges of effective alkali was that, in the former case, the xylan yield was considerably higher and the glucomannan yield somewhat smaller, resulting in an approximately 1% higher pulp yield. The addition of borohydride resulted in a considerable increase in the glucomannan yield and a small decrease in the xylan yield with a net effect of about 3% higher yield. Chemical composition and DP was determined on xylan samples isolated from the pulps. (Author abstract modified)

3985 APTIC NUMBER 13579

Barker, Maurice E.
CATALYST. U. S. Pat. 1,916,249. 3p., July 4, 1933. (Appl. Sept. 5, 1928, 4 claims).

The invention comprises the formation of alloys of copper, iron, and manganese; copper and manganese; and copper and iron, and the treatment of the alloys to produce the desired catalysts. A catalyst in the form of a porous spongy mass can be obtained by either oxidizing the cast alloy until all exposed surfaces are covered with a coating of the porous mixture or treating the alloy with chlorine gas, hydrochloric acid, or nitric acid and calcining the substances formed. A catalyst in the form of a mixture of oxides can also be prepared by chemical treatment and calcination. If preferred, alloys may first be ground to granular or powder form. Iron and copper alloys have been found to convert carbon monoxide into carbon dioxide at low temperatures and to accelerate the oxidation of sulfur to sulfur dioxide. The addition of manganese is suggested to accelerate the oxidation of carbon and sulfur oxides into higher oxides.

3986 APTIC NUMBER 13558

Barrer, Richard M. and William E. Addison
DISPROPORTIONATION OF NITRIC OXIDE USING CRYSTALLINE ZEOLITES AS CATALYSTS. (Union Carbide Corp., New York, N. Y.) U.S. Pat. 2,853,365. 7p., Sept. 23, 1958. 1 ref. (Appl. Feb. 7, 1955, 12 claims.)

A process for disproportionating nitric oxide to form nitrous oxide and higher nitrogen oxides is presented. The nitric oxide is absorbed by partially dehydrated zeolite crystals at a temperature below 0 C. At this temperature, the nitric oxide is decomposed to nitrous oxide and nitrogen peroxide. At 150 C the nitrous oxide is liberated and the nitrogen peroxide forms nitrogen dioxide and nitric oxide. Nitrogen dioxide is liberated by heating the zeolite crystals to 200 C.

3987 APTIC NUMBER 13307

Barrow, Emily M., Solange Amos, and John B. Graham
CERTAIN BIOCHEMICAL PROPERTIES OF HUMAN AHF (FACTOR VIII) SEPARATED FROM FIBRINOGEN WITH MANGANOUS CHLORIDE AND THROMBIN. J. Lab. and Clin. Med., vol. 68:803-812, July-Dec. 1966. 9 refs.

Full antihemophilic factor (AHF, Factor VIII) activity is retained when citrated human plasma is dialyzed against MnC12 then treated with weak thrombin. Investigations were designed to determine whether the thrombin-resistant AHF of MnC12-dialyzed plasma differs from the AHF of citrated plasma in other biochemical properties. Results showed that the AHF of the MnC12-dialyzed plasma is more stable to heat and storage at various temperatures than that of untreated plasma, is more difficult to precipitate with ethanol and $(NH_4)_2SO_4$, and is retarded somewhat when passed through Sephadex G-200. The pH of optimal stability and the pH range of inactivation were not altered by the treatment. Although the resistance to thrombin is related to the dialysis against MnC12, the increased heat stability is related to dialysis itself because the AHF of citrated plasma dialyzed against NaCl is as stable as 55 C as that of the MnC12-dialyzed plasma. (Author abstract modified)

3988 APTIC NUMBER 13935

Basevich, V. Ya. and S. M. Kogarko
KINETIC CALCULATIONS OF LOW-TEMPERATURE OXYGEN-HYDROGEN AND OXYGEN-CARBON MONOXIDE FLAMES. (Kineticheskiye raschety nizkotemperaturnykh kislorodnykh plamen vodoroda i okisi ugleroda). Text in Russian. Fiz. Goreniya Vzryva, 3(1):98-104, 1967. 18 refs.

A study was made to determine the accuracy with which the burning rate in a flame for mixtures of various composition and at various pressures can be described while retaining the same rate constants. It was found that for the elementary events of propagation of low-temperature oxygen-hydrogen and oxygen-carbon monoxide flames, computer calculation of combustion rate according to established rate constants is possible with an accuracy characterized by a ratio of root-mean-square deviation to an experimental value of 0.09-0.20. Experiments were conducted in 1.44, 1.6, 2.8 and 10.3 liter spherical bombs; the starting pressure was 50 mm Hg with 6.9-18% hydrogen.

3989 APTIC NUMBER 13298

Bate, L. C.
ADSORPTION AND ELUTION OF TRACE ELEMENTS ON HUMAN HAIR. Intern. J. Appl. Radiation Isotopes, 17(7):417-423, July 1966. 9 refs.

A study was preformed to see (1) how extensively the trace-element content of hair might be modified by the adsorption of environmental trace elements and (2) if solvents could be

found that would remove the adsorbed elements. The elements studied were Na, K, Cl, Br, Cu, Zn, Au, Se, Cr, I, As, Ag, Sb, Co, Fe, Mn, Ca, Ba, and Sr. The procedure was to place a sample of hair in a solution containing the measured quantities of the element and a radioactive tracer; after 16 hrs the hair was measured for the quantity of radioactivity of the element adsorbed. Potassium, Na, and Cs did not adsorb on hair. The cation adsorption for an element increased as pH 7 was approached, while the amount of anion adsorption for an element decreased. The elements Au, Se, Sb, and As, when adsorbed on hair yielded adsorption curves similar to those obtained with anions. Kyro EO, a commercial shampoo, removed 50% or less of the radioactivity from the hair in one wash, and further washing did not remove any significant quantity of the remaining radioactivity. The elements Zn, Fe, Ba, Co, Mn, and Sb were removed by solutions containing EDTA, but no solvent could be found that would remove Au, Ag, and Se. Higher concentrations of the elements were found on longer strands of hair, increasing in proportion to distance from head.

3990 APTIC NUMBER 13395

Beaujean, John and V. B. Bodenheimer
COLD CAUSTIC PULP FROM SINGLE STATE REFINING. Pulp Paper Mag. Can., 63(3):T168-200, 1962.

In order to minimize the costs of making cold caustic pulp, an atmospheric soak with single stage refining and refiner bleaching was tried. A cold caustic plant was built in order to achieve higher utilization of mixed hardwoods. The process steps are shown on a flowsheet. Since the biochemical oxygen demand is approximatel 200 lbs/ton from a cold caustic plant, the excess liquor from the live bottom bin drainer conveyor was saved. Quality of product ranged from good to poor. In single stage refining about three-quarters of stock is refined to an excellent pulp; approximately one-quarter is predominately small shives. There was no problem setting a 60 brightness, economically. Freenesses were maintained at 350 to 400 Canadian Standard and refiner horsepower was approximately 30 hp days/ton. The cost of the plant was within the budgeted amount and actual maintenance costs were small.

3991 APTIC NUMBER 13485

Beelik, Andrew, Romeo J. Conca, J. Kelvin Hamilton, and E. Vernon Partlow
SELECTIVE EXTRACTION OF HEMICELLULOSES FROM SOFTWOODS. Tappi, 50(2):78-81, Feb. 1967. 15 refs. (Presented in part at the Northwest Regional Meeting of the American Chemical Society, Corvallis, Ore., June 14, 1965.)

A new procedure based on the principle of selective extraction was developed for the isolation of the three main hemicelluloses from softwood holocelluloses. Selectivity is assured by impregnating the holocellulose with 1-2% barium hydroxide in the first of three extraction steps. Impregnation was particularly effective when used in conjunction with 10% potassium hydroxide. Xylans readily dissolved in this medium, while the dissolution of mannose-containing polymers was largely suppressed. After removal of the barium hydroxide, the easily soluble galactoglucomannan was extracted from the holocellulose in the second step of the sequence with 1% sodium hydroxide, and the glucomannan in the last step with 15% sodium hydroxide. All three hemicelluloses obtained in this fashion were quite homogeneous, and thus tedious secondary purifications by precipitation could be kept to a minimum. (Author Abstract Modified)

3992 APTIC NUMBER 13025

Belcher, Ronald
DRY ABSORBENTS FOR THE ABSORPTION OF SULPHUR DIOXIDE, WITH SPECIAL REFERENCE TO THE DETERMINATION OF CARBON IN STEELS. J. Soc. Chem. Ind. vol. 64:111-114, April 1945. 10 refs.
Because the conventional wet absorbents for sulfur dioxide used in combustion train in the determination of carbon in steels have a number of disadvantages, a search has been made for a reliable wet absorbent. Experiments were conducted with zinc, potassium permanganate, silver chromate, silver ferrocyanide, silver metavanadate, anhydrone, silver orthovanadate, manganese dioxide and silver permanganate. Only manganese dioxide and silver permanganate were found to be effective. Either reagent will absorb the sulfur dioxide produced from steels containing as much as 0.73% sulfur. Manganese dioxide has the advantage of cheapness and ease of preparation. Silver permanganate may find application in special cases, such as in the determination of carbon in organic substances containing halogens as well as sulfur. (Author abstract modified)

3993 APTIC NUMBER 13371

Bering, B. P. and V. V. Serpinskiy
ON THE THEORY OF MONOMOLECULAR ADSORPTION ON UNIFORM SURFACES. (K teorii monomolekylyarnoy adsorbtsii na odnorodnykh poverkhnostyakh). Text in Russian. Doklady Akad. Nauk SSSR, 79(2):273-276, 1951. 15 refs.

Monomolecular adsorption on a uniform surface, with attention to the effect of interaction between adsorbed molecules, was examined. Two possible limiting cases are distinguished: 1) adsorption layer on a surface with discrete time-invariant force centers (localized layer), and 2) adsorption layer on a surface, all points of which are equivalent when averaged over time (nonlocalized layer). An expression for differential heat of adsorption as a function of the degree of surface coverage, applicable to both cases, is derived and verified on the basis of 16 isotherms taken from the literature (2 for a mercury surface, 14 for BaF2 and BaSO4 surfaces; adsorbed substances: SO2, CO2, N2, NH3, CH3OH, and C3H7OH).

3994 APTIC NUMBER 13065

Bernard, Claude and Yves-Michel Gargouil
PERMEABILITY OF THE EMBRYONIC MYOCARDIAL MEMBRANE OF THE RAT; A STUDY OF ITS EVOLUTION DURING EMBRYOGENESIS BY THE USE OF THE INHIBITORS TETRODOTOXIN, MANGANESE, AND TETRAETHYLAMMONIUM. (Les permeabilities de la membrane myocardique embryonnaire de rat; etude de leurs evolutions au cours de l'embryogenese a l'aide d'inhibiteurs: tetrodotoxine, manganese, tetraethylammonium). Text in French. Compt. Rend. Acad. Sci. (Paris), vol. 267 Ser. D:1626-1629, Nov. 13, 1968. 17 refs.

Tetrodotoxin at a dose level of 0.00001 g/ml, decreased the action potential in isolated embryonic rat hearts at 13, 16, and 21 days post-coitus, presumably by specifically inhibiting sodium flow. Manganese, in doses of 4 mM/L, shortened the plateau of the action potential, its effect being more noticeable at 13 days than at 16 or 21 days. Tetraethylammonium chloride, 20 mM/L also inhibited the action potential; in this case the age of the embryos made no difference.

3995 APTIC NUMBER 13229

Berry, Sheila A. and J. W. Campbell
THE EXTRACELLULAR NUCLEASE ACTIVITY OF MICROCOCCUS SODOMENSIS. II. CHARACTERIZATION AND MODE OF ACTION. Biochim. Biophys. Acta, 132(1):80-93, Jan. 1967. 16 refs.

The purified extracellular nuclease of Micrococcus sodomensis was shown to contain non-specific phosphodiesterase activity against native and denatured DNA, RNA, polyadenylic acid, and adenylyl-3',5'-adenosine. It was found to be exonucleolytic in its action, requiring a free 3'-hydroxyl group. An associated phosphomonoesterase activity specific for 5'-ribo- and deoxyribomononucleotides was demonstrated. The only requirement for monoesterase activity is Mn(2+), while the diesterase requires Mg(2+) in addition to Mn(2+), with Ca(2+) having a stimulatory effect. Monoesterase activity is more heat-resistant than the diesterase, but both are destroyed by heating for 5 min at 90 C. The heat sensitivity of both activities is increased in the presence of Mg(2+) and Mn(2+) and decreased in the presence of Ca(2+). The optimum pH for both activities was 8.8. The possibility of the existence of a single protein exhibiting both diesterase and monoesterase activity is discussed. (Author summary modified)

3996 APTIC NUMBER 13196

Bertinchamps, A. J., S. T. Miller, and G. C. Cotzias
INTERDEPENDENCE OF ROUTES EXCRETING MANGANESE. Am. J. Physiol., vol. 211:217-224, July 1966. 21 refs.

Radiomanganese (Mn^{54}) was excreted by all intestinal segments investigated at several exponential rates. Yet the cephalad segments showed much higher excretion, which could be accelerated briskly by giving manganous sulfate, whereas excretion via the ileum could not. Intestinal excretion contrasted to biliary excretion: the tracer entered the bile in two successive 'waves.' The first wave reflected the initial plasma clearance, signaling direct passage of some Mn in the direction of a steep concentration gradient between plasma and bile. This concentration gradient became even steeper during the second wave. This wave preceded the one reported by others for bile acids. It could be abolished by feeding low-Mn milk, but it was reinduced promptly by injecting manganous sulfate into the duodenal lumen. Increasing the Mn loads increased the duration rather than the height of this wave. Since both the artificial and the natural Mn isotopes reflected these phenomena, it appeared that small amounts of the essential trace metal had saturated its enterohepatic circulation. The excess was apparently excreted via the duodenum and the jejunum. (Author abstract modified)

3997 APTIC NUMBER 13918

Beuschlein, W. L.
THE RECOVERY OF SULPHUR DIOXIDE. Pacific Pulp Paper Ind., 10(6):20-21, 1936.

Resistance to the absorption of sulfur dioxide in the chemical system CaO-H2O-SO2 is entirely in the gas and liquid films over the absorbing solution. A rise in temperature decreases the resistance of liquid film. The effect of temperature on gas film is not precisely understood. The mechanism by which gas and liquid velocities affect absorption rates is described by the actions of such velocities on the respective films. As velocity increases, film thickness decreases, causing a lower resistance since resistance is proportional to thickness. Where gas film offers 5% of the total resistance, an appreciable gain may result from doubling liquid velocity. However, high-strength tower acid diminishes the absorption driving force, and the expected gain due to increased liquid velocity may result in an actual absorption loss. Equations are given for calculating the absorption rate where liquid film controls resistance, and for determining equilibrium conditions in the proposed system. Conditions favoring absorption are shown to be large interfacial area, tower length, gas-liquid interfacial concentration, low film resistance, and concentration of the main body of the absorbing solution.

3998 APTIC NUMBER 13078

Beytia, Enrique, Pablo Valenzuela, and Osvaldo Cori
TERPENE BIOSYNTHESIS: FORMATION OF NEROL, GERANIOL, AND OTHER PRENOLS BY AN ENZYME SYSTEM FROM PINUS RADIATA SEEDLINGS. Arch. Biochem. Biophys., 129(1):346-356, Jan. 1969. 37 refs.

The properties of a soluble enzyme system obtained from Pinus radiata seedlings, which transforms 2-C-14-mevalonic acid (MVA) into C5 and C10 alcohols, were studied. The system incorporated 6 to 7% of the radioactivity from MVA into isopentenol, dimethy lallyl alcohol, nerol, and geraniol and

required Mg(2+) or Mn(2+) and SH groups for optimal activity. Five and ten-carbon prenols are formed from the corresponding phosphorylated derivatives by a phosphatase, which may be partially inhibited by NaF. About 1% of the radioactivity from MVA remains bound to the proteins in an apparently non-covalent association. This radioactivity, which behaves mainly as C15 prenols, may be related to the biosynthesis of carotenes or phytol, and not to monoterpenes. It can be extracted with 1-butanol. The identification of C-14-isopentenol in a hexane-soluble fraction, after incubation of the enzyme system with MVA, suggests that isopentenyl pyrophosphate (IPP) is hydrolyzed by an acid phosphatase. Dimethyl allyl alcohol, identified in the same fraction, is probably formed by enzymic hydrolysis of dimethy allyl pyrophosphate (DMAPP). The sensitivity of the enzyme system forming allylic phosphates also suggests the isomerization of IPP to DMAPP. Formation of geraniol and geranyl pyrophosphate (GPP) is probably related to the biosynthesis of diterpenes, carotenes, and phytol. There is no evidence that GPP is the precursor of monoterpenes.

3999 APTIC NUMBER 13085

Billard, Francois, Jean Pricard, Michel Cabane, and Ingo Wilmanns
A STUDY OF THE MOBILITY OF SMALL POSITIVE IONS IN AIR BY THE METHOD OF PASSAGE TIME. (Etude de la mobilite des petits ions positifs dans l'air par la methode du temps de vol). Text in French. Compt. Rend. Acad. Sci. Ser. B (Paris), 267(2):112-115, July 8, 1968. 5 refs.

The spectrum of mobility of small positive ions produced by coronal discharge in air gives rise to a series of maxima in which the mobilities depend on the aging time of the ions, as well as on the impurities of the air. Mobility values were in good agreement with those obtained for small radioactive ions in air. Maximum values were in agreement with those determined in purified gases. For a given aging time, the introduction of either sulfur dioxide or water vapor causes a displacement of the spectrum toward lower mobilities and successive disappearance of the higher mobilities.

4000 APTIC NUMBER 13256

Birnie, G. D. and Sylvia M. Fox
THE SYNTHESIS OF POLYDEOXYRIBONUCLEOTIDE BY CELL-FREE EXTRACTS OF EMBRYONIC MOUSE TISSUE. Biochem. J., 104(1):239-243, July 1967. 19 refs.

The conditions under which soluble extracts prepared from mouse embryos incorporate H-3-labeled thymidine 5'-triphosphate into polydeoxyribonucleotide were studied. In common with similar preparations from other mammalian tissues, mouse embryo DNA nucleotidyltransferase requires the four complementary deoxyribonucleoside 5'-triphosphates, primer DNA, and a bivalent cation for activity. Unlike other mammalian DNA nucleotidyltransferases, the rate and extent of the incorporation of H-3-labeled thymidine 5'-triphosphate is much greater with Mn(2+) than with Mg(2+) and, with either Mg(2+) or Mn(2+), maximum activity occurs at pH6.6. The difference between Mg(2+) and Mn(2+) varies markedly with pH, reaching a maximum of six- to eight-fold at pH 6.6. (Author abstract modified)

4001 APTIC NUMBER 13486

Bolker, Henry I., Fei Lin Kung, and Moh Lian Kee
DELIGNIFICATION BY NITROGEN COMPOUNDS, III. PRELIMINARY STUDIES ON THE MECHANISM OF DELIGNIFICATION BY NITROUS ACID. Tappi, 50(4): 199-202, April 1967. 11 refs. (Presented at the Annual Meeting of the Technical Association of the Pulp and Paper Industry, held in New York, N. Y. Feb. 24, 1966.)

At pH 2.0 and 70 C, nitrous acid acted on guaiacol (I) to give mainly the 4-oxime of 2-methoxy-p-benzoquinone (II) and traces of 6-nitro-(III), 4-nitro-(IV), and 4,6-dinitroguaiacol (V). Veratrole (VI) reacted only slightly, producing traces of (V) and 4-nitroveratrole (VII); 2,6-dimethoxyphenol (VIII) yielded coerulignone (IX); 1,2,3-trimethoxybenzene (X) did not react. At pH 1.0 and 100 C, I yielded III and IV and a trace of V; VI gave V and VII, both in greater yield than under milder conditions; and X gave low yields of 2,6-dimethoxy-p-benzoquinone (XI) and 5-nitro-1,2,3-trimethoxybenzene (XII). IV, V, and XI were also recovered from the acid liquor obtained by treating birch dioxane lignin with nitrous acid at pH 2.0 and 70 C. Under the same conditions, spruce dioxane lignin yielded only IV and V. The results suggest that hardwood pulps may respond better to delignification by nitrous acid than softwood pulps. (Authors' abstract modified)

4002 APTIC NUMBER 13825

Bonnell, John M.
CONDITIONS FOR OSCILLATORY COMBUSTION IN AN ANNULAR GAS COMBUSTOR. Combustion Inst., Pittsburgh, 21p., 1967. 12 refs. (Presented at the Western States Section Meeting, Combustion Inst., Seattle, Wash., Oct. 30-31, 1967, Paper WSCI 67-36.)

An analysis of the limiting conditions is presented for the sustaining of a tangentially-propagating pressure disturbance in a thin, annular, gas-phase combustion zone. The conditions for either oscillatory of stable combustion are determined for a burning mixture of ideal gases in an annular combustion zone. The mixture, flowing steadily in the axial direction, is perturbed by a small amplitude, tangentially-propagating pressure disturbance. The rate of energy release is described by an Arrhenius function. The analysis yields a critical value of the Arrhenius exponent that exists at a line demarcating regions of stable and oscillatory combustion. The critical exponent is a function of the flow field variables, the specific heat ratio, and the reaction rate frequency factor. A partial, qualitative verification of the analysis is provided by the known stability behavior of premixed and unmixed gases burned in cylindrical combustors. (Autho abstract modified)

4003 APTIC NUMBER 13873

Booter, Rene, Robert Hagemann, Guy Nief, and Etienne Roth
THERMODYNAMIC STUDY OF SULFUR OXIDES BY MASS SPECTROMETRY. (Etude thermodynamique de l'hemioxyde de scufre par spectrometrie de mass). Text in French. Advan. Mass Spectrometry, vol. 3: 951-972, 1966. 24 refs.

The action of oxygen on sulfur at low pressure under high frequency discharge conditions was studied by continuous mass spectrometric analysis of the reaction products. The mass spectra of the gas subjected to the discharge corresponded to a mixture of SO2, S2O, S2, and O2. Though thermodynamic calculations indicate that at high temperatures SO and S2O should coexist in equilibrium, S2O2 and SO molecules were not present in the reaction products. The absence of SO molecules suggests that if the formation of SO is influenced by the temperature of the filaments, there is a reduction of equilibrium in the zone of the reactor between the filaments and the introductory capillary of the mass spectrometer. The heat of formation of S2O was calculated from measurements of the appearance potentials of the SO(I) irons issuing from SO2 and S2O: -18.5 kcal/mole less than delta Hf(S2Og) less than -7 Kcal/mole. (Author summary modified)

4004 APTIC NUMBER 13648

Boronin, V. S., V. S. Nikulina, and O. M. Polmorak
CHEMISORPTION AND CATALYSIS ON PLATINIZED SILICA GELS. III. CHEMISORPTION OF OXYGEN. (Khemosorbtsiya i kataliz na platinirovannykh silikagelyakh III. Khemosorbtsiya kisloroda). Text in Russian. Zh. Fiz. Khim., 41(10):2668-2674, 1967. 11 refs.

The sorption of oxygen on platinized silica gels with various degrees of Pt dispersion was studied from 20-470 C at 0.001-1.5 mm Hg. A method for estimating the platinum surface area of adsorption catalysts from the chemisorption of oxygen is proposed and utilizes a volumetric adsorption arrangement described in an earlier article. It was found that optimum measurement of the surface area of platinum on a substrate by this oxygen chemisorption method is achieved at 400 C with extremely low pressures. At about 1 mm Hg, the quantity of chemisorbed oxygen is very close to the maximum corresponding to an oxygen monolayer covering the platinum.

4005 APTIC NUMBER 13693

Bosshard, E. and E. Jaag
STUDIES OF THE ADSORPTION OF GASES AND VAPORS BY VARIOUS TYPES OF SILICA GEL. (Untersuchungen uber Adsorption von Gasen und Dampfen durch verschiedene Sorten von Silica-Gel). Text in German. Helv. Chim. Acta, vol. 12:105-113, 1929. 6 refs.

Various types of silica gel were produced by converting silicic acid through addition of acetic or hydrochloric acid under constant agitation by a forceful stream of air. Since it was expected that drying speed and temperature influence the properties of the gel, these parameters were varied. Moreover, through variation of the concentrations of the initial solutions and by using FeCl3 instead of acid in one instance, 13 kinds of silica gels were obtained. For comparison, two commercially available gels were also used. Sulfur dioxide diluted with pure, dry air and bromine fumes were passed through a stationary layer of gel at temperatures from 20 to 80 C. The amount of gas adsorbed was determined by the weight increase of the gel and also by iodimetry. All gels but one (gel 13 precipitated with FeCl3) followed the adsorption isotherms by Freundlich. Gel produced from diluted water glass solution could adsorb more sulfur dioxide than gel of concentrated water glass solution. Slowly activated gels adsorbed more sulfur dioxide than rapidly activated ones. Gel 13, which was precipitated with FeCl3 instead of acid, was highly adsorbent. At increasing temperature, adsorption decreased with all kinds of gels. Adsorption ability did not suffer from repeated use of the gel (65 regenerations). Adsorption of bromine vapors was accompanied by condensation. Here too rapid activation reduced the adsorption capacity. Gel precipitated with acetic acid had a pore size favoring condensation. On the whole, bromine vapors were as well adsorbed as sulfur dioxide. Some swelling was observed with the gels when placed in benzene, which lead to the assumption that a relationship between swelling and adsorption exists similar to that in activated charcoal.

4006 APTIC NUMBER 13599

Brallier, Paul S.
TITANOUS CHLORIDE FOR THE DETERMINATION OF IRON AND OF CHLORIC ACID. Ind. Eng. Chem., 19(7):846-848, 1927. 14 refs.

Directions for the analytical determination of iron and chloric acid with titanous chloride are given. Tabulations of iron determinations, chlorate determinations and the effect of sodium arsenite on ferric salts are presented. Data indicate this method is highly accurate.

4007 APTIC NUMBER 13355

Brcic, Branko S., Danilo Dobcnik and Ljubo Golic
THE REACTION KINETICS OF NITROGEN OXIDES WITH CALCIUM OXIDE. (Uber den Verlauf der Bindung der Stickstoffoxyde an Calciumoxyd). Text in German. Monatsh. Chem., 94(6):1145-1153, 1963. 6 refs.

For the isothermal measurement of the sorption of nitrogen oxides on CaO at pressures from 0.05 to 1 atm and at temperatures from 20 to 650 C, the CaO was freshly prepared from CaCO3 by heating to 900 C within 90 min and maintaining this temperature for 30 min. The specific surface obtained was 5.0 plus or - 0.2 sq m/g. The nitrogen oxides were obtained from nitric acid and P2O5. The measuring unit consisted roughly of a quartz spiral and a thermocouple. The results show that in the reaction process,

Ca(NO3)2 is mainly formed, along with small amounts of Ca(NO2)2. A 6% maximum amount of Ca(NO2)2 is formed at 150 C and decreases with rising temperature. Above 350 C, the fraction is as low as 2%. It also decreases with time: at 300 C, 4.3% was measured after 40 min., 2.6% after 180 min., and 1.9% after 1200 min. Reaction kinetics over the temperature range studied at 1 atm can be divided into three stages. During the first stage below 50 C, N2O5 is formed. Its reaction with CaO results in the formation of Ca(NO3)2, which is no obstacle to further reaction. In the second stage, between 50 and 400 C, a nitrate layer develops rapidly on the surface, preventing any further formation of Ca(NO3)2 by blocking diffusion of the nitrogen oxides. In the third stage, above 400 C, the gaseous phase comes in contact with a more or less pronounced melt where the mixture of nitrogen oxides and oxygen dissolves and leads to further formation of Ca(NO3)2. At 610 C, the sorption limit is reached.

4008 APTIC NUMBER 13195

Britton, A. A. and G. C. Cotzias
DEPENDENCE OF MANGANESE TURNOVER ON INTAKE. AM. J. Physiol., vol. 211:203-206, July 1966. 11 refs.

The turnover of parenterally administered Mn54 was found to be directly related to the level of stable manganese in the diet of mice over a wide range. The concentration of Mn54 in various tissues was also directly related to the level of Mn55 in the diet, suggesting that a variable excretion, rather than a variable absorption regulates the concentration of this metal in tissues. The whole-body turnover of Mn54 can be approximated roughly by two exponential functions, suggesting that Mn is distributed in at least two sets of compartments with different sizes and transfer constants. The relative size and transfer constant of the compartment with the slower turnover was linearly related to the concentration of Mn in the diet. (Author abstract modified)

4009 APTIC NUMBER 13885

Brock, J. R.
COMMENTS ON 'THIRTEEN-FORTY THEORY OF THE THERMAL FORCE ON A SPHERICAL PARTICLE'. Phys. Fluids, vol 11:922-923, April 1968. 15 refs.

Certain limitations in the theory proposed by Dwyer for the thermal force on a spherical particle are discussed. It is assumed that the particle is suspended in an effectively infinite gas so that the dynamical system can be characterized partly by the single Knudsen number, L/a, where L is the molecular mean free path and a is the particle radius. Two general conclusions made by Dwyer are claimed to be without experimental support. These conclusions are concerned with the use of Waldmann's equation and the calculation of a correct free molecular limit for the thermal force. Previous experimental results have shown that Waldmann's equation is applicable only in the case of a large free molecular region, and is not applicable in a general sense. It is concluded that there is no experimental data for the thermal force on particles which correspond to the conditions of Dwyer's theory.

4010 APTIC NUMBER 13332

Brooks, Robert D. and Norman S. Thompson
FACTORS AFFECTING THE CLEAVAGE OF GLYCOSIDIC BONDS IN ALKALI. Tappi, 49(8):362-366, 1966. 44 refs.

The reaction of methyl-beta-glucoside at temperatures from 140-170 C, at several oxygen concentrations, and at two levels of hydroxyl ion concentration permitted an evaluation of factors influencing the cleavage of the glycosidic bond. The number of moles of glycoside consumed equalled the number of moles of methanol formed, indicating that cleavage of the glycosidic bond did occur. The rate of cleavage of glycosidic bonds at a given temperature proceeded at different rates depending on the pH of the cooking liquor and the amount of oxygen in the system. Under the nitrogen-purged (oxygen-free) conditions with an excess of alkali, the Arrhenius plot of the reaction rate of methyl-beta-glucoside was linear and corresponded to an activation energy of 36,000 cal/g-mole. The presence of oxygen in the system resulted in greatly increased rates of degradation. The data indicate that more oxygen was consumed by secondary reactions and less with glycosidic bond cleavage at lower temperatures than at high temperatures. Oxygen concentration and pH were additive and not independent variables. Reaction pathways consistent with data in the literature and current research are proposed. (Author abstract modified)

4011 APTIC NUMBER 13235

Brown, A. P.
VOLUME CONTRACTION OF ISOLATED PEA CHLOROPLASTS PROMOTED BY BIVALENT CATIONS. Biochem. J., 102(3):791-800, March 1967. 39 refs.

Chloroplasts isolated from pea seedlings were incubated in a sucrose-tris medium reinforced with salts of calcium, magnesium, manganese, or iron. Measurements of chloroplast-pellet volume and water content showed that the bivalent cations caused a contraction in chloroplast volume and a loss of chloroplast water. Measurements of the light scattering and fluorescence of the suspension confirmed this conclusion and eliminated the possibility of contraction being caused by centrifugal forces. The uptake of 45Ca(2 plus) was measured and shown to be competitive with diluent Ca(2 plus), Mg(2 plus), or Mn(2 plus) ions, indicating a mechanism of low specificity. It is suggested that the contraction process does not consume much energy, but that is light-activated contraction a previous step occurs that is conducive to contraction and that is energy-transducing. It is postulated that this step results in a local increase in concentration of bivalent cations, which promotes contraction. (Author abstract modified)

4012 APTIC NUMBER 13660

Burson, J. H., III, E. Y. H. Keng, and C. Orr, Jr.
PARTICLE DYNAMICS IN CENTRIFUGAL FIELDS. Powder Technol., 1(5): 305-315, 1968. 9 refs.

The dynamic behavior of small particles suspended in moving fluids is fundamental to the design of centrifugal separators, classifiers, gas cleaners, etc. The trajectories in centrifugal force fields of particles with diameters from one to 50 microns were examined both theoretically and experimentally. Equations were developed and solved by analog computer for the nonsteady, two-dimensional motion of particles in viscous fields. An experimental centrifugal classifier was developed that permitted initial conditions and types and strengths of centrifugal fields to be varied widely. Experimental results are shown to be in excellent agreement with theoretical predictions for a wide range of particle diameters when a function generator fit of experimental drag coefficient data is employed. (Author abstract modified)

4013 APTIC NUMBER 13923

Buturlin, V. V.
FREQUENCY AND SOME INFORMATION CONCERNING EPIDEMIOLOGY OF CHRONIC NONSPECIFIC DISEASES OF THE LUNGS IN INTELLECTUALS. (Chastota i nekotoryye svedeniya ob epidemiologii khronicheskikh nespetsificheskikh zabolevaniy legkikh u lits umstvennogo truda). Text in Russian. Terapevt. Arkh., 40(11):57-60, 1968. 4 refs.

Frequency of chronic nonspecific diseases of the lungs among intellectuals who had been under dispensary observation for many years was studied. Chronic pneumonia was revealed in 1.81%, chronic bronchitis in 1.16%, and nonspecific pneumosclerosis in 0.5%. Moreover, post-tuberculous pneumosclerosis was revealed in 0.26% and adhesive pleurisy in 0.54%. The average age of patients with chronic diseases of the lungs was higher than that in healthy individuals. The percentage of undernourished persons among patients with pulmonary diseases proved to be the same as in healthy individuals. Excessive nourishment among patients with pulmonary diseases was encountered as frequently as among patients with diseases of other systems and organs and much more frequently than in healthy patients (apparently due to older age of these patients as compared to healthy ones). Influenza, catarrh of the upper respiratory tract, and angina in the anamnesis of patients with chronic diseases of the lungs was encountered more often than in healthy persons and patients with other diseases; still greater difference was observed in the incidence of pneumonia and acute bronchitis sustained in the past (75.2% in patients with chronic diseases of the lungs and 23.1% in healthy ones). Among patients with chronic diseases of the lungs there were many more smokers than among healthy persons and those with other diseases 60% and 45% respectively. (Author summary modified)

4014 APTIC NUMBER 13597

Caddick, Arthur J.
RECOVERY OF SULPHUR FROM SULPHUR DIOXIDE. Mining Mag. (London), 49(5):282-285, Nov. 1933.

Procedures for the recovery of sulfur from sulfur dioxide gas by the use of incandescent carbonaceous matter are reviewed. Experiments were conducted by the author to ascertain the effect of varying amounts of steam on SO2 recovery, the steam being admitted at the bottom of the coke column together with the ingoing SO2 gas.

4015 APTIC NUMBER 13598

Caddick, Arthur J.
SULPHUR FROM SULPHUR DIOXIDE. Mining Mag. (London), 53(6):339-346, Oct. 1935.

Secondary reactions occurring during the reduction of sulfur dioxide by incandescent carbonaceous matter were investigated. It was found that carbonyl sulfide and carbon disulfide were generally present in the reduced gas. Experiments were conducted to ascertain whether these gases could be converted to elemental sulfur. Results indicated that the sulfur content of these gases is recoverable by their admixture with sulfur dioxide. One part carbon disulfide reacted with one part sulfur dioxide to form CO2 and 3S. Two parts carbon oxysulfide reacted with one part SO2 to form 2 CO2 and 3S.

4016 APTIC NUMBER 13082

Camacho, T. F.
SPECIFIC ION ELECTRODE FOR MONITORING MILL STREAM SODA LOSSES. Southern Pulp Paper Mfr., 30(6):96, 98-101, June 10, 1967. 2 refs. (Presented at the meeting of the S.E. Sect. Tech. Assoc. of the Pulp and Paper Industry, Jacksonville, Fla., Jan. 20-21, 1967).

In order to improve monitoring of soda loss in washed pulp and mill effluent streams, a glass electrode specific towards sodium ions was evaluated. Control methods now used at various stages of the process are discussed. They include flame spectrophotometry and relating conductivity to soda content. The experimentally determined relationship between the sodium electrode and flame spectrophotometer showed excellent correlation with a buffered sample and good correlation with decker pulp discharge. The sodium electrode was found to be as accurate as the flame spectrophotometer and less complicated to run. Once the sodium electrode test method for stock cleanliness is shortened and the accuracy of the sample preparation steps is improved, implementation on a plant scale will be proposed.

4017 APTIC NUMBER 11780

Cameron, F. K.
ABSORPTION OF SULFHUR DIOXIDE BY CALCIUM PHOSPHATES. J. Mitchell Soc., 47(1):30, Jan. 1932.

Vapor pressure measurements were made of mixtures of water, sulfur dioxide, and calcium phosphates between zero and 90 C. Between 25 and 100 C under pressures from 3 to 10 atm., calcium phosphate may be completely dissolved by an aqueous solution saturated with SO2. Phosphoric acid goes into solution more rapidly than the lime, but at equilibrium the lime is in excess. With ground phosphate rock, all the phosphoric acid may be made available by this method. Dry treatment of the rock with gaseous SO2 at high temperatures involves complex reactions, with much decomposition of SO2 and liberation of elemental sulfur. About two-thirds of the phosphoric acid is thus made available. Good recoveries of available phosphoric acid are obtainable with SO2, but with no promise of economy over standard practice with sulfuric acid.

4018 APTIC NUMBER 13926

Caraboqdan, I.
RELATIONS BETWEEN THE COMBUSTION RATE OF PARTICLES OF SOLID FUELS AND THE OXYGEN CONTENT OF THE SURROUNDING SPACE. (Beziehungen zwischen der Verbrennungsgeschwindigkeit von Partikeln fester Brennstoffe und dem Sauerstoffgehalt des Umgebenden Raumes). Text in German. Rev. Roumaine Sci. Tech., Ser. Electrotech. Energet., 12(2):275-289, 1967. 9 refs.

The dependence of formation time of particles of solid carbon fuels, combustion time of the volatile constituents, and combustion time of the carbon residues on the oxygen concentration, the kind of fuel, and the temperature was determined for various particle sizes between 0.5 and 3 mm mean diameter. On the basis of the data from these previous experiments, analytical expressions for preparation and combustion times were derived on the assumption that the relative velocity of the particle with respect to the medium with which it interacts is equal to zero. The equation takes into account the kind of solid fuel, particle size, oxygen content, and the mean temperature of the medium in the vicinity of the particle. Coefficients and exponents occurring in these expressions are tabulated.

4019 APTIC NUMBER 13062

Carson, John F. and Francis F. Wong
SEPARATION OF ALIPHATIC DISULFIDES AND TRISULFIDES BY GAS-LIQUID PARTITION CHROMATOGRAPHY. J. Org. Chem., 24(2):175-179, Feb. 1959. 17 refs.

The application of gas-liquid partition chromatography to the separation and isolation of some aliphatic disulfides and trisulfides is discussed in connection with a study of the volatile components of onions. The polar phases, Carbowax and Reoplex, and a nonpolar phase, Apiezon M, were compared in the separation. It was found that mixtures of disulfides and trisulfides can be separated at 150 C without serious decomposition. No exchange reactions occurred between mercaptans, disulfides, and trisulfides, and allylic disulfides were separated without the formation of monosulfides. Absence of decomposition during chromatographic separation was confirmed by infrared analysis of collected fractions. The polar phases were particularly useful for separating unsaturated disulfides from the corresponding saturated compounds.

4020 APTIC NUMBER 13559

Caudle, P. G. and K. G. Denbigh
KINETICS OF THE ABSORPTION OF NITROGEN PEROXIDE INTO WATER AND AQUEOUS SOLUTIONS. Trans Faraday Soc., 49:39-52, 1953. 9 refs.

Experimental measurements were made on the rate of absorption of nitrogen peroxide into water and aqueous solutions of sodium hydroxide and calcium chloride. The absorption speed was determined as a function of the gas composition, the gas and liquid flow rates, and the temperature. Over a large range of conditions it is found that the absorption rate is a linear function of the concentration of N2O4 in the gas phase. This indicates that the speed of the process is determined by the chemical reaction of N2O4 with water, and not by diffusion. In order to explain the effect of gas and liquid flow rates some tentative new ideas are put forward which represent a departure from the traditional 'two film' theory. It is suggested that, at any moment, the whole of a gas-liquid interface is not equally active in absorption, and that the activity of any part is determined by the local conditions of eddying and mixing which, in turn, depend both on the gas and liquid flow rates. Attention is also drawn to the phenomenon of rippling at the interface. (Authors' abstract modified)

4021 APTIC NUMBER 13500

Cescotti, P.
BURNERS AND FLAME TECHNOLOGY. J. Inst. Fuel, 41(325):77-84, Feb. 1968. 2 refs.

Fundamental factors dealt with are flame speed anchorage, flame speed, and the influence of tube diameter, mixture range of inflammation, quench limits, flashback, and effect of pressure on flame velocity. These factors are applied to illustrate types of burners, control of gas flow, injectors, double injection, flame checks, and the use of hydrogen as a flame accelerator. The burning characteristics of town gas and natural gas are compared.

4022 APTIC NUMBER 13561

Chambers, F. S., Jr. and T. K. Sherwood
ABSORPTION OF NITROGEN DIOXIDE BY AQUEOUS SOLUTIONS. Ind. Eng. Chem., 29:1415-1422, 1937. 24 refs.

The significance of diffusional resistances in the absorption of nitrogen dioxide by water and aqueous solutions of nitric acid or alkali was studied. Nitrogen dioxide was absorbed from a mixture in nitrogen using basic solutions varying from 2.7 to 34.1% NaOH and acid solutions varying from 5.7 to 69.8% HNO3. Similar tests were carried out in a wetted-wall tower and in a batch absorption vessel. The observed absorption rates for NO2 were compared with corresponding evaporation rates of water in the same apparatus. The rate of absorption was greatest for pure water, and much less in strong acid or basic solution. The gas film diffusional resistance was the controlling factor in absorption rate. The results are explained by the hypothesis of reaction in the gas phase, with the deposition of a nitric acid mist in the gas film. New data are presented on vaporization of water, desorption of ammonia from aqueous solution absorption of ammonia by water and acid, and absorption of sulfur dioxide by base in the wetted-wall tower. (Authors' abstract modified)

4023 APTIC NUMBER 13297

Cheniae, G. M. and I. F. Martin
PHOTOREACTIVATION OF MANGANESE CATALYST IN PHOTOSYNTHETIC OXYGEN EVOLUTION. Biochem. Biophys. Res. Commun., 28(1): 89-95, 1967. 14 refs.

Experiments are reported on the restoration of photosynthesis and the Hill reaction in Mn-deficient cells of the blue-green alga Anacystis. Expressed per unit chlorophyll, respiration of the deficient alga is several fold greater than that of normal Anacystis cells. At low intensities a marked difference 4.6 in the rate of photosynthesis (uncorrected for respiration) was observed between normal and deficient cells. The addition of Mn(2 plus) and illumination resulted in an increase of photosynthesis but did not change the respiration rate. Deficient cells showed considerably lower Hill-reaction rates, and addition of Mn(2 plus) and light, in the absence of quinone, KCN, and FeCN, improved the activity of the reaction. It was concluded that Mn(2 plus) is bound to its apoenzyme in a dark thermal reaction but is inactive as a catalyst in oxygen-evolution; activation of the complex occurs in a photochemical reaction, sensitized by photosystem II. Bound-Mn(2 plus) possibly is oxidized to higher valency in the photoreaction.

4024 APTIC NUMBER 13287

Cheniae, George M. and Iris F. Martin
SITE OF MANGANESE FUNCTION IN PHOTOSYNTHESIS. Biochim. Biophys. Acta, 153(4):819-837, May 1968. 43 refs.

Manganese-deficient Scenedesmus cells, showing no marked changes in chloroplast lamellar structure or respiratory activity, were used in an analysis of the effect of Mn deficiency upon flash yield of O2 and quantum yields of photosynthesis and quinone photoreduction. It was shown that, with increasing deficiencies, loss of chloroplast-bound Mn led to decreased flash yield of O2 (measure of E, the photochemical substrate of Photosystem II) and increasing quantum requirement of photosynthesis and quinone photoreduction. The decreased amount of E as a result of manganese deficiency is reflected in increasing sensitivity to 3-(3,4-dichlorophenyl)-1, 1-dimethylurea. From measurements of flash yield of O2 and quantum yield of photosynthesis with cells containing a determined amount of chloroplast-bound Mn, it was shown that approximately eight Mn occur for each E equivalent. The amount of bound Mn was linear with the amount of E and not quantum yield. It is concluded that manganese functions specifically in the photochemical complex E of Photosystem II. (Author summary modified)

4025 APTIC NUMBER 13268

Chenoweth, Maynard B.
CLINICAL USES OF METAL-BINDING DRUGS. Clin. Pharmacol. Therap., 9(3):365-387, May-June 1968. 251 refs.

Only three drugs are available for metal chelation in man. These are dimercaprol, calcium disodium edetate, and D-penicillamine. Arsenic and mercury poisonings call for immediate systematic treatment with dimercaprol; symptoms of chronic lead poisoning respond well to systemic calcium disodium edetate; Wilson's disease is ameliorated by oral D-penicillamine and all the other situations discussed are still experimental and sub judice. Many of the observations reported on the effects of these drugs do not seem to be clearly related to metal binding. Certain toxic metals such as cadmium, thallium, beryllium, and manganese have, as yet, no notably effective antidotes. (Author abstract modified)

4026 APTIC NUMBER 13898

Chertkov, B. A.
OXIDATION OF CALCIUM SULFITE IN THE EXTRACTION OF SO2 FROM GASES. (Okisleniye sul 'fita kal 'tsiya v protsesse izvlecheniya SO2 iz gazov). Text in Russian. Zh. Prikl. Khim., vol. 33:1708-1714, 1960. 7 refs.

The rate of oxidation of calcium sulfite formed in the extraction of SO2 from exhaust gases was found to average 9.4 g/sq m-hr with an average oxygen absorption coefficient of 72 g/sq m-hr-atm for the test absorber. The degree of oxidation was found to result from the simultaneous effect of a number of factors influencing mass transfer in the liquid phase (e.g., reflux density, temperature, and composition of reflux solution). It was found that addition of 0.002-0.004% P-aminophenol to the circulating solution has a long-term retarding effect on calcium sulfite oxidation and results in a three to five-fold decrease in sulfate formation.

4027 APTIC NUMBER 13255

Christofferson, Kristin
SEPARATION AND DETERMINATION OF CARBONYL COMPOUNDS IN SULFITE

SPENT LIQUOR BY ION EXCHANGE CHROMATOGRAPHY. Svensk Papperstid., 67(17):540-544, Sept. 15, 1967. 19 refs.

A method is described for determination of carbonyl compounds in sulfite spent liquor. The compounds are taken up from the liquor on an anion exchanger in its bisulfite form and separated by elution with sodium bisulfite. The following compounds were isolated and identified: acetaldehyde, formaldehyde, pyruvic acid, pyruvaldehyde, 5-hydroxymethylfurfural, furfural, and vanillin. The final determinations were made spectrophotometrically. A good recovery was achieved when known quantities of these compounds were added to the liquor. In an appendix directions are given for the colorimetric determination of pyruvic acid, pyruvaldehyde, glyceraldehyde, and dihydroxyacetone. (Author abstract modified)

4028 APTIC NUMBER 13833

Clancey, J. T. and J. A. Phinney
STATUS OF CO2 ACCEPTOR PROCESS DEVELOPMENT. Preprint, American Gas Assoc., 13p., 1965. (Presented at the Am. Gas Assoc. Conference Operating Section Meeting, Buffalo, N. Y., May 25, 1965.)

Work on the CO2 acceptor process for the conversion of lignite or bituminous coal to pipeline gas is reported. Developed under the sponsorship of the Office of Coal Research, the system comprises a gasifier, a regenerator with appropriate feeding, control equipment, and instrumentation. The process is based on the gasification of carbon with steam in the presence of a lime-bearing acceptor. Heat is liberated when the lime reacts with carbon dioxide produced as a result of the water gas and water gas shift reactions. In a second vessel, the spent acceptor is regenerated to drive off CO2, residual carbon from the gasification step supplying the necessary heat by combustion with air. Oxygen is not required for the gasification phase and gases produced are enriched in hydrogen and methane due to the removal of CO2. The application of these reactions to the conversion of lignite is discussed. Preheated lignite is first devolatized at approximately 1400 F by contact with gasifier offgases. The char from devolatilization is then gasified with steam in the presence of acceptor at approximately 1600 F; the residual char is used to supply the heat in regeneration. Product gas resulting from the steam carbon reaction and devolatilization of lignite will consist of methane plus hydrogen and carbon monoxide in the proper ratio for subsequent purification and methanation. Feasibility studies indicate that a commercial version of the process could be in operation by 1975. Gasification kinetics are being studied with batch and bench-scale apparatus. Further data will be obtained from pilot-plant studies in South Dakota.

4029 APTIC NUMBER 13847

Cleveland, S. T., K. Okajima, and R. D. Pehlke
GALVANIC CELL MEASUREMENT OF THE THERMODYNAMIC INTERACTION BETWEEN ZINC AND LEAD IN DILUTE SOLUTION IN LIQUID TIN. J. Phys. Chem., 69(12):4085-4090, Dec. 1965. 11 refs.

Galvanic cells with liquid chloride electroytes were used to investigate the thermodynamic interaction parameters of the ternary system tin-zinc-lead and the binary system tin-zinc from 450 to 650 deg. The reversible electro-magnetic forces of the cell were measured over this temperature range and the activity coefficient of zinc was calculated from an equation based on the mole fraction of zinc, Faraday's constant, cell potential, gas constant, and absolute temperature. Graphical techniques were used to evaluate the interaction parameters. Binary data obtained are consistent with previous work. They show that the activity of zinc in the dilute system tin-zinc closely follows Henry's law, i.e., the self-interaction parameter for zinc is very small. In the ternary system tin-zinc-lead, small additions of lead tend to increase the activity of zinc in dilute solution with solvent tin. The zinc-zinc and zinc-lead interaction parameters are shown to be a linear function of the reciprocal absolute temperature and expressible by an equation developed by the investigators.

4030 APTIC NUMBER 13452

Clough, P. N. and R. A. Thrush
FORMATION OF VIBRATIONALLY EXCITED N2O IN THE REACTION OF N ATOMS WITH NO2. Discussions Faraday Soc., No. 44:205-207, 1967. 7 refs.

Nitrogen dioxide was added to active nitrogen from a microwave discharge to learn if vibrational excitation characterized the newly formed bonds of the polyatomic reaction products N2O plus O plus 42.8 kcal. At 0.5 mm. Hg, emission of v1 plus v3 and v2 plus v3 was found, but at 0.05 mm Hg the intensities of bands involving v1 and v2 were found to be greatly reduced relative to those involving only v3, demonstrating the collisional redistribution of energy from v3 to v1 and v2. When total pressures were raised, there was no evidence of either 2v3 or v2 plus v3, and it was concluded that less than 10% of the molecules formed with stretching vibrational energy have any excitation of v2. The failure to detect excitation of the bending vibration v2 suggests a 'repulsive' type of surface where the energy is released during product separation.

4031 APTIC NUMBER 13191

Conklin, Edwin R.
1968 ANNUAL STATISTICAL REPORT: PART I. Elec. World, 169(4):81-96, Jan. 22, 1968.

Current and future capital expenditures of investor-owned power companies, federal agencies, and municipal and rural electric cooperative systems are reported in text and tables. Included are plant expenditures for generation, transmission, distribution, maintenance, and new expenditures for lines (overhead and underground) and substations. Tabulated data cover 1968 budgets,

long-range (1968-1972) budgets, transmission and distribution construction, capital spending by ownership and region, transmission and distribution expenditures by ownership and region, and transmission and distribution construction by ownership and region. Capital spending by Canadian utilities is also surveyed. Despite continued high interest rates, record expenditures are indicated. For 1968, the industry budgeted $8.8 billion, one billion more than 1967 and an increase of 12.8%. Though an increase in nuclear plant spending is reported, fossil-fueled plants will account for 61.2% of the total expenditures for 1968. Hydroelectric generation continues to decrease as potential sites become more scarce.

4032 APTIC NUMBER 13481

Connelly, Jerald L. and Curtis H. Hallstrom
STUDIES ON THE MECHANISMS CONTROLLING TIME OF ONSET AND EXTENT OF MITOCHONDRIAL SWELLING. Biochemistry, 5(2):570-577, Feb. 1966. 24 refs.

Volume changes in rat liver mitochondria are influenced by pH and by varying concentrations of swelling agent, adenosine triphosphate (ATP), respiratory substrate, and divalent cations. The response to these agents of selected aspects, extent and time of onset, of the swelling process was studied. Variations in time of onset and extent of swelling from pH 6.2 to pH 8.4 were qualitatively parallel. Increased concentrations of swelling agent (orthophosphate, calcium, thyroxine) result in decreasing time of onset but have a minimal effect on extent. Added substrate or ATP acts to reverse the effect of swelling agent on time of onset. These same agents reverse the effect of hydrogen ion on both time of onset and extent up to pH 7.6. Increasing concentrations of magnesium or manganese increase the time of onset when orthophosphate is the swelling agent but have no effect when calcium replaces orthophosphate. In marked contrast, magnesium and manganese decrease the extent with either swelling agent. The ability of ATP to increase the extent, but not the ability of ATP to increase the time of onset, is inhibited by pyrophosphate and uridine triphosphate. These observations provide evidence for the differentiation of mechanisms controlling time of onset and extent of swelling and suggest a multiple rather than simple relationship between swelling and other energy-requiring functions of the mitochondrion. (Author abstract modified)

4033 APTIC NUMBER 13296

Cotzias, George C., Paul S. Papavasiliou, Edwin Hughes, Lily Tang, and Donald C. Borg
SLOW TURNOVER OF MANGANESE IN ACTIVE RHEUMATOID ARTHRITIS ACCELERATED BY PREDNISONE. J. Clin. Invest., vol. 47:992-1001, 1968. 30 refs.

Total-body and area counts of intravenously injected Mn-54 were measured periodically in patients with rheumatoid arthritis and a control group. The control group showed fair reproducibility and considerable variation in subsequent loss of the isotope. Ingestion of excess manganese sulfate resulted in increased loss of the radioisotope, indicating the presence of a mechanism operating to control excretion of the metal. Slow turnover rates of the metal were demonstrated in seven out of eight patients with rheumatoid arthritis. Statistically significant differences were encountered in the measurements of Mn-54 turnover of the total body, the thyroid, and the liver. Administration of prednisone caused clinical improvement and significant acceleration of turnover rates. Slow turnover rates are characteristic of nutritional manganese deficiency. Therefore, serum and blood manganese determinations were performed by neutron activation analysis on 14 control patients and on six patients with active rheumatoid arthritis. A statistically significant elevation of the red cell manganese concentration was encountered in patients with rheumatoid arthritis. This argued against the classical notion of trace metal deficiency. (Author abstract modified)

4034 APTIC NUMBER 13227

Crone, H. D.
THE CALCIUM-STIMULATED INCORPORATION OF ISOTOPIC SERINE AND ETHANOLAMINE INTO THE PHOSPHOLIPIDS OF HOUSEFLY (MUSCA DOMESTICA) LARVAE. Biochem. J., 102(1):48-52, Jan. 1967. 5 refs.

The incorporation of ethanolamine and serine into the phospholipids of the larvae of the housefly is dependent on the calcium ion concentration, maximal rates being obtained at 20 mM in an imidazole buffer. The incorporation of both compounds is inhibited by tris buffer and a number of other aminoalcohols. Effectiveness as competitors depends on the distance between amino and hydroxy groups, and on the possession of a primary hydroxy group. The incorporation of radioactive serine or ethanolamine is judged to be a direct exchange with existing nitrogenous bases on the phospholipids, rather than a reflection of net synthesis of the lipids. This is because of the kinetics of the incorporation, which do not favor the presence of intermediates, and because the incorporation is calcium-dependent, whereas the incorporation of phosphorylethanolamine in the same system is stimulated by magnesium and not by calcium. These results indicate the presence of one enzymic system exchanging ethanolamine, serine, and foreign aminoalcohols with the bases of phospholipids.

4035 APTIC NUMBER 13351

Croon, Ingemar
SOFTWOOD SULPHITE PULPS IN INCREASED YIELD BY THE ALKALI-SULPHITE (A-S) METHOD. Svensk Papperstid. (Stockholm), 66(1): 1-5, 1963. 19 refs.

A pretreatment of wood chips with alkaline solutions (5-50 g NaOH/L), at temperatures below 70 C for 30 - 90 min gives 2 - 7% (calculated on the wood) higher yield in the succeeding digestion with sulfite acid, than that from a digestion without the pretreatment. The defibration point of the alkali acid

sulfite pulps is reached in the yield region 68-70%, compared to 58-60% for the conventional one-stage sulfite pulps. The glucomannan content of the pulp increases, and it is assumed that the main reason for its stabilization consists of the deacetylation effect of the pretreatment. Full yield gain is obtained whether the chips are digested directly after the pretreatment or washed and stored in moist or dried form and digested later. These results illutrate the great flexibility of the alkaline-acid type of two-stage cooking. (Author abstract)

4036 APTIC NUMBER 13453

Crowell, E. P. and E. P. Burnett
MICRO DETERMINATION OF ROSIN AND FATTY ACIDS IN TALL OIL. TAPPI, 49(7):327-328, July 1966. 4 refs. (Presented at the 51st Annual Meeting of the Technical Association of the Pulp and Paper Industry, held in New York, N. Y., Feb. 20-24, 1966.)

The standard procedure for the determination of total rosin acids and acid number, ASTM D-803, requires 9 g of sample for single determinations. Therefore, it is not applicable to situations were large quantities of tall oil are not available. Such is the case with samples of crude tall oil from black liquor streams of the kraft pulping process. The boron trifluoride-methanol esterification procedure for selectivity masking fatty acids in the rosin acid determination was investigated and found to be attractive because it is simple to use and has proven applicability to small samples. Gas chromatographic investigation showed that this methylation procedure is selective for fatty acids and is therefore acceptable for this purpose. The minimum sample requirement for the determination of both fatty and rosin acid is 75 mg of tall oil. Acceptable agreement between the ASTM procedure and this micro method was observed for samples with greater than 15% rosin acids. (Authors' abstract)

4037 APTIC NUMBER 13306

Cunningham, G. W., M. B. Wise, and E. R. Barrick
EFFECT OF HIGH DIETARY LEVELS OF MANGANESE ON THE PERFORMANCE AND BLOOD CONSTITUENTS OF CALVES. J. Animal Sci., 25(2):532-538, 1966. 19 refs.

Fifty-two Holstein male calves were used in two experiments to determine the minimum dietary toxic level of manganese and the effect of high levels of dietary manganese on performance and blood constituents. A basal ration containing 12 ppm of manganese was used in both experiments with manganese sulfate added to give the desired manganese levels. In Experiment I, levels of added manganese were 0, 820, 2460, and 4920 ppm with seven individually-fed calves per treatment. Body weight gains and feed intake were depressed at the high dietary levels of manganese. No significant differences were found between treatments in feed efficiency, hemoglobin, serum calcium, serum inorganic phosphorus, serum magnesium or serum alkaline phosphatase activity. In Experiment II, levels of added manganese were 0, 1000, 2000, and 3000 ppm with six calves/ treatment fed for 100 days. The four calves comprising each replication received equal amounts of feed. No significant difference was found in average daily gain or feed efficiency. A significant depression in blood hemoglobin level was noted with increasing dietary manganese. No differences were found between treatments in any of the serum constituents measured. (Author summary modified)

4038 APTIC NUMBER 13252

Curtis, P. J. and R. M. S. Smellie
PROPERTIES OF A PURIFIED RAT-LIVER NUCLEASE. Biochem. J., 98(3):818-825, March 1966. 14 refs.

The pH optimum, ionic requirement, and heat stability of a purified liver nuclease were examined with RNA and denatured DNA as substrates. The enzyme attacked DNA and RNA in an endonucleolytic manner, forming oligonucleotides terminated by 5'-phosphate groups. No clear specificity was found with respect to the bases at the site of cleavage. Comparison of the results obtained with RNA and denatured DNA as substrates suggests that the ribonuclease and deoxyribonuclease activities are associated with the same protein. (Author abstract modified)

4039 APTIC NUMBER 13635

Danilova, Y. T. and G. S. Freits
REACTION OF METALS WITH SULFUR DIOXIDE. (Vzaimodeystviye metallov s sernistym gazom.) Text in Russian. Izv. Akad. Nauk SSSR, Otd. Tekhn. Nauk, 11:25-33, 1955. 6 refs.

Reaction of metallic zinc, cadmium, lead, and copper with sulfur dioxide was studied at the Institute of Metallurgy as an important intermediate reaction in the oxidation of metal sulfides. Over the range 227-927 deg, tabulated values of free reaction energy reveals the relative reactivity sequence: zinc, cadmium, lead, copper. The same sequence is reflected in a plot of relative reaction rate at 800 deg. Copper was non-reactive over the range 20-1290 deg. Most complete reaction was found to occur at 600 deg for lead and 800 deg for zinc. The ratio of sulfide to sulfate in the reaction product increases with reaction temperature.

4040 APTIC NUMBER 13944

Das Mahant, Sampuran
THE OXIDATION OF SULPHUR DIOXIDE IN THE ELECTRODELESS DISCHARGE. Indian Chem. Soc. J., vol. 9:417-422, 1932. 15 refs.

The oxidation of sulfur dioxide was stimulated by electrodeless discharge in a series of laboratory experiments designed to study the effect of the discharge on mixtures of different composition, the influence of change of frequency on the percentage of sulfur dioxide oxidized, and the influence of mercury on the oxidation process. The reaction mechanism of

the discharge was investigated by spectrographic analysis of the spectra of the glow produced in pure sulfur dioxide, sulfur dioxide in the presence of mercury, sulfur dioxide and oxygen as a mixture, sulfur dioxide and oxygen in the presence of mercury, and mercury in a vacuum. Results indicate that the maximum amount of sulfur dioxide is oxidized when a mixture is composed of 60% sulfur dioxide and 40% oxygen. The absence of thiosulfuric and polythionic acids in the reaction products shows that the electrodeless discharge is not similar to auto-oxidation. The general similarity of the emission spectrum of sulfur dioxide and mixtures of sulfur dioxide and oxygen reveals that pure sulfur dioxide is first decomposed into oxygen and sulfur when subjected to the discharge. The activated oxygen then combines with sulfur dioxide to form sulfur trioxide. In mixtures of sulfur dioxide and oxygen, the oxygen alone is activated and combines with sulfur dioxide.

4041 APTIC NUMBER 13936

Davtyan, O. K. and Ye. N. Ovchinnikova
CHEMISORPTION AND OXIDATION OF SULFUR DIOXIDE ON SOLID CATALYSTS AT NORMAL TEMPERATURE. (O khemisorbtsii i okislenii sernistogo angidrida na tverdykh katalizatorakh pri normal'noy temperature). Text in Russian. Doklady Akad: Nauk SSSR, 104(6):857-860, 1955.

An attempt was made to explain the catalytic oxidation of sulfur dioxide on the basis of a theory proposed by O. K. Davtyan. The following catalysts were studied: spongy platinum applied to porous phosphorus through reduction from a solution of chloroplatinic acid, activated charcoal, vanadium pentoxide obtained by coagulation of a colloidal solution in the form of a powder (without carrier), powdered graphite, powdered chromium trioxide, and powdered ferric oxide (listed in order of decreasing activity). In all cases, chemisorption was found to proceed with sufficiently high rate at room temperature, the oxidation products being readily removed as sulfuric acid by washing with water. Curves of total adsorption and chemisorption rates as a function of time were plotted. It is noted that the presence of water vapor on the catalyst surface usually increases the maximum quantity of oxidized sulfur dioxide.

4042 APTIC NUMBER 13939

Davtyan, O. K., B. A. Manakin, E. L. Misyuk, and Yu. N. Polishchuk
INVESTIGATION OF THE MECHANISM OF HETEROGENEOUS OXIDATION, HYDROGENATION AND ELECTROCHEMICAL COMBUSTION ON SOLID CATALYSTS. III. RELATION BETWEEN THE DEPOLARIZING OXIDES ON CARBON AND PLATINUM AND THE CATALYTIC EFFECT OF THE LATTER IN THE OXIDATION OF SO2. (Issledovaniye mekhanizma protessov okisleniya, gidrirovaniya i elektrokhimicheskogo goreniya na tverdykh katalizatorakh. III. Svyaz' mezhdu depolyarizuyushchimi okislami na ugle i platine s kataliticheskim deystviyem poslednikh v reaktsii okisleniya SO2). Text in Russian. Zh. Fiz. Khim., 35(4):1186-1191, 1961. 4 refs.

The chemisorption of oxygen onto platinum and activated carbon was studied for the case of catalytic oxidation of SO2 using a new electrochemical method in combination with chemical methods. It was established that oxygen being chemisorbed on the surface at 20-100 C participates in forming the potential of the oxygen electrode. The same chemisorption of oxygen takes place with electrochemical oxidation. Oxygen chemisorbed on carbon or platinum at these temperatures is shown to participate in catalytic oxidation of SO2. During this reaction, all oxygen capable of participating in the electrochemical process completely leaves the catalyst surface. It was found that platinum catalyst becomes poisoned in an atmosphere of SO2 at 20 C, rendering it incapable of oxygen chemisorption.

4043 APTIC NUMBER 13940

Davtyan, O. K. and E. N. Ovchinnikova
INVESTIGATION OF THE MECHANISM OF OXIDATION, HYDROGENATION AND ELECTROCHEMICAL COMBUSTION ON SOLID CATALYSTS. I. OXIDATION OF SULFUR DIOXIDE ON ACTIVATED CARBON AT 20 C IN THE PRESENCE OF WATER VAPOR. (Issledovaniye mekhanizma okisleniya, gidrirovaniya i elektrokhimicheskogo goreniya na tverdykh katalizatorakh. i. Okisleniye sernistogo angidrida na poverkhnosti aktivirovannogo uglya pir 20 C v prisutstvii vodyanykh parov). Text in Russian. Zh. Fiz. Khim., 35(4): 713-718, 1961. 2 refs.

The low-temperature oxidation of sulfur dioxide on the surface of activated carbon at 20 C was studied, and a method was developed for determining the absorption and oxidation of SO2 when the oxidation product remains adsorbed on the surface. It was found that in the presence of water vapor, the oxidation product is held on the surface in the form of sulfuric acid. As the amount of adsorbed water vapor increases, the quantity of sulfuric acid absorbed on the carbon reaches some maximum determined by the partial pressure of oxygen in the gaseous phase. Removal of the H2SO4 from the carbon completely restores its activity.

4044 APTIC NUMBER 13705

Dawson, J. P. and D. J. Ellis
PULSED CURRENT OPERATION OF HOLLOW CATHODE LAMPS TO INCREASE THE INTENSITY OF RESONANCE LINES FOR ATOMIC ABSORPTION SPECTROSCOPY. Spectrochim. Acta, vol. 23A:565-569, 1967. 4 refs.

Pulses of high intensity resonance radiation were obtained by passing large currents of short duration repetitively through conventional hollow cathode discharge lamps. In addition to high intensity, the emitted radiation appears to be practically free from self absorption and, as the mean power dissipated in the lamp is low, the working life of the lamp is extended. The shelf life also appears to be increased. This mode of lamp operation may be applied to the determination of a wide variety of elements, including Ca, Co, Cu, Mg, Mn, Pb, and Sr by atomic absorption spectroscopy. Other applications of the operation

could include atomic fluorescence spectroscopy and new forms of multichannel atomic absorption instruments.

4045 APTIC NUMBER 13264

Becker, Richard H. and Charles H. Dicken
BIOCHEMICAL OBSERVATIONS ON LEUCINE AMINOPEPTIDASE II OF HUMAN SKIN. J. Invest. Dermatol., 48(2):128-132, 1967. 25 refs.

The properties and distribution of leucine aminopeptidase II (LAP-II) in human skin were studied by biochemical techniques. The enzyme in skin which hydrolyzes leucyl-beta-naphthylamide differed from the classical LAP in that it was activated by cobalt and inhibited by manganese, an activator of LAP-I. Whole skin has substantial amounts of LAP-II (1,000 units/gm/hr). While the major portion of the enzyme activity was found in the dermis, the specific activity of the enzyme in the epidermis was five to nine times that of the dermis. Incubation of thin sections of whole skin for 20 minutes in buffer resulted in solubilization of about 70% of the LAP-II activity. These findings must be considered when interpreting data obtained by the histochemical assay for aminopeptidase. (Author summary modified)

4046 APTIC NUMBER 13345

Decker, W. J.
THE INFLUENCE OF LETHAL X-IRRADIATION ON TRACE METAL UPTAKE BY THE MITOCHONDRION. Experientia, 24(5):448-449, May 15, 1968. 5 refs.

Determinations of the post-irradiation exchange of trace metals in mitochondria was undertaken by means of radioisotopic tracers. The trace metals studied were coenzymatic in nature. Total body X-irradiation of adult female rats followed by sacrifice and analysis yielded a pattern of change in cation uptake which was somewhat complex. As a general trend, there was an increase in the uptake of zinc, cobalt, iron, nickel, and selenium; there was a decrease in the uptake of manganese and chromium. The results indicate that the transport of certain trace metals across the mitochondrial membrane may be markedly altered by ionizing radiation.

4047 APTIC NUMBER 13435

Devones, K. W.
SOAP RECOVERY-DOUGLAS-FIR KRAFT OPERATION. Tappi, 46(10):167A-169A, Oct. 1963.

A system used for tall-oil soap recovery from Douglas-fir kraft liquor is described. Initial studies were made to determine the amount of recoverable soap present in the liquor by simple batch phase separations of the soap from the liquor in a 55-gal drum. Optimum retention time is 4 hours, at which recovery efficiency is 90%. Third effects of the multiple effect evaporators result in 30% black liquor solids; This concentration gives a yield of 33 lb of tall oil per ton of kraft pulp. A diagram of a soap recovery system is given, and the skimming-tank operation is explained. Tall-oil soap was found to contain 52% tall oil, 7% black solids, and 39% moisture. Tall oil was analyzed and found to contain 35% fatty acid and 40% resin acid.

4048 APTIC NUMBER 13313

Dinnin, Joseph I.
ATOMIC FLUORESCENCE FLAME SPECTROMETRIC DETECTION OF PALLADIUM, TITANIUM, ZIRCONIUM, CHROMIUM, AND ALUMINUM USING A HOT HOLLOW CATHODE LAMP. Anal. Chem., 39(12):1891-1893, Oct. 1967.

A hollow cathode tube containing the element of interest was excited to maximum intensity and, using a mirror and microphotometer, the emitted light was examined for identifying lines of the element. A burner was then inserted in the optical path to replace the mirror and a 1000 ppm solution of the element was aspirated into the flame. The fluorescence response of the element at various heights in the flame was scanned over the full available wavelength range and measured on the microphotometer. The fluorescence of palladium, titanium, zirconium, chromium, and aluminum was obtained for what was believed to be the first time. In addition, the fluorescence responses of manganese, cobalt, and iron were verified. Flame height adjustment for Mn, Co, and Fe was unusually critical. Further study of the fluorescence intensity of the vapors of the transition elements was advised.

4049 APTIC NUMBER 13436

Drew, John
OBSERVATIONS FROM EXPERIMENTAL DATA IN ACIDULATION OF TALL OIL. Tappi, 46(2):128A-129A, Feb. 1963.

The solvent process for extracting tall oil from tall-oil soap involves the introduction of a solvent such as naphtha into the soap skimmings, water, and sulfuric acid. The mixture is then placed in an acidulation reactor. The solvent is recovered by evaporation. It was found that when more black liquor was removed from the soap before acidulation productivity was higher. This reduction was accomplished by the addition of a small amount of water to the soap. The preferred pH value of the mixture is 3.7. Data show that the solvent process improves product quality but that the process is economically unfeasible. The research is being conducted by Glidden.

4050 APTIC NUMBER 13413

Dubinin, M. M. and G. M. Plavnik
MICROPOROUS STRUCTURES OF CARBONACEOUS ADSORBENTS. Carbon, 6(2):183-192, May 1968. 11 refs.

The microporous structure of coals (anthracite and lean coal) carbonized and activated with water vapor at 900 C was investigated by the small-angle X-ray scattering and adsorption methods. As distinct from the previously studied active carbons from sucrose possessing uniform microporosity (inertia radii R=6-7 A), coals are characterized by a considerably greater polydispersity of micropores Small-angle X-ray scattering data, which were in agreement with the results of the theoretical analysis of benzene adsorption isotherms, revealed coarser micropores of R=11-14 A along with fine micropores of R=6-7 A, in active coals. At low degrees of activation, fine micropores are predominant in the active carbons obtained. As burn-out increases, the fraction of coarser micropores grows. It is believed that the size polydispersity of active coal micropores, which roughly corresponds to the radius range products used for activation, i.e., anthracite and lean coal. (Author abstract modified)

4051 APTIC NUMBER 13878

Duell, M. G. and A. J. B. Robertson
DECOMPOSITION OF FORMIC ACID ON NICKEL AND COPPER WIRES WITH NORMAL CATALYTIC ACTIVITY AND WITH CATALYTIC SUPERACTIVITY. Trans. Faraday Soc., Vol. 57:1416-1425, 1961. 28 refs.

The decomposition of formic acid on nickel and copper was first-order at low pressures. The probability P of decomposition when a formic acid molecule strikes the catalytic surface was determined. Normal catalytic activity is shown by metal wires which have not been flashed at a high temperature; for both metals the activation energy of P increases above a certain temperature. The low-temperature results support the idea of a mobile transition state; the high-temperature reaction is interpreted with a hypothesis of preferential decomposition on active sites which increase in number with temperature. After flashing at high temperature, nickel and copper wires show catalytic 'superactivity'. In this way the catalytic activity of nickel can be increased 100,000 times. On nickel, P is unity over a large temperature range. On copper, P equals 0.07. The superactivity of nickel is frozen into the wire; it is not removed by annealing for a time in vacuum, nor by cooling to room temperature, nor by slight oxidation. Superactivity disappears rapidly when formic acid reacts and normal activity is soon shown; at first, superactivity can spontaneously appear again, without another flashing, when the formic acid is removed. A wire after flashing contains a high concentration of vacancies which can aggregate to form dislocations. Superactivity is discussed with two hypotheses: first, that surface vacancies are active catalytic sites; secondly, that the catalytic reaction induces a surface mobility of metal atoms. (Author abstract modified)

4052 APTIC NUMBER 13060

Dufay, J.
THE ORIGIN OF ATMOSPHERIC METALS. (Sur l'origine des metaux atmospheriques). Text in French. Ann. Geophys., 24(2):393-398, 1968. 32 refs.

Twilight spectroscopic observations of neutral and ionized atmospheric metals are reviewed. Observations of calcium, lithium, potassium, and sodium are discussed; a table is included of relative concentrations in the atmosphere, sea, and meteorites, collated from the data of many workers since 1938, and relative values are compared. Although the meteoritic origin of Ca(+) ions is accepted, the need for further investigation to determine the origin of the other atmospheric metals is emphasized.

4053 APTIC NUMBER 13454

Dunnicliff, H. B., Sardar Mohammad, and Jai Kishen
THE INTERACTION BETWEEN NITRIC OXIDE AND HYDROGEN SULPHIDE IN THE PRESENCE OF WATER. J. Phys. Chem. Vol. 34:1721-1734, 1931. 18 refs.

The reactions of nitric oxide and hydrogen sulfides in the presence of water, ammonium nitrite, ammonium sulfide, or ammonium thiosulfate were studied and their products were determined and measured. Nitric oxide reacted with hydrogen sulfide solution giving ammonium nitrite, ammonium thiosulfate, sulfur, nitrous oxide, and nitrogen. An ammonium sulfide solution was decomposed by nitric oxide to give polysulfides of ammonium and small amounts of ammonium thiosulfate and nitrous oxide and nitrogen were evolved. Excess of the reducing agent gave pure nitrogen, but excess of the oxidizing agent increased the yield of nitrous oxide. Saturated hydrogen sulfide solution completely reduced nitrous oxide to nitrogen and ammonia, and slowly converted ammonium nitrite into ammonia and small amounts of nitrogen. Nitric oxide slowly converted dilute solutions of ammonium thiosulfate into ammonium sulfate and nitrogen.

4054 APTIC NUMBER 13684

Durau, Felix
THE ADSORPTION OF GASES ON SODIUM CHLORIDE AND AQUEOUS SODIUM CHLORIDE SOLUTION. (Uber Adsorption von Gasen an Natriumchlorid und wassriger Natriumchloridlosung). Text in German. Ann. Physik, Vol. 87:307-384, 1928. 10 refs.

Adsorption of 12 gases on NaCl was studied. For this purpose, NaCl was carefully cleaned and degassed. The liberated gases were analyzed and the NaCl was pulverized in a nitrogen atmosphere. The measurements were taken at pressures below 0.4 mm with a MacLeod gauge and at atmospheric pressures by volumetry. The adsorption isotherms of N2, H2, CO2, O2, and NO on non-heated NaCl were determined, followed by studies of the N2 and CO2 adsorption on NaCl degasses at 480 C. Strikingly, adsorption of CO2 decreased instead of increasing as had been expected. This can be explained by changes of the surface properties. The surface properties were studied in detail by heating pulverized NaCl in CO2, O2, H2, and N2 and by treating it with water vapor. By observation of the saturation pressure of concentrated NaCl solution in the water vapor experiments, it can be concluded that an aqueous solution forms around the

individual NaCl crystals, but only part of the surface of this solution adsorbs. With O2, it was observed that adsorption on the solution was irreversible, which explains why it is so difficult to remove water vapor from the surface. In the adsorption of all other gases except water vapor, not even a monomolecular layer formed on the surface. Due to the reversibility of the processes observed with most of the gases, it can be concluded that only adsorption took place without diffusion. Adsorption increased with the boiling point of the adsorbed gas. Adsorption of CO was higher and can be explained by its dipolar character. Adsorption is caused by van der Waal forces and amplified by the dipolar properties of the adsorbed gas. Lattice defects cause higher adsorption owing to their higher energy.

4055 APTIC NUMBER 13370

Dzis'ko, V. A., D. V. Tarasova, and G. P. Vishnyakova
EFFECT OF PREPARATION METHOD ON POROUS STRUCTURE AND STRENGTH OF CATALYSTS AND CARRIERS. I. UNIFORMLY PORCUS SILICA GEL. (Vliyaniye sposoba prigotovleniya na poristuyu strukturu i prochnost' katalizatorov i nositeley. I. Odnorodnoporistyye silikageli). Text in Russian. Kinetika i Kataliz, 8(1):193-197, 1967. 7 refs.

The effects of moisture during formation, hydrothermal working, and roasting temperature on the porous structure and strength of uniformly porous silica gel were studied. Hydrothermal working and increased roasting temperature were found to be ways to increase contact strength between silica gel globules. Pore volume increased from 0.5 to 1.1 cu cm/g, while strength decreased from 400 to 130 kg/cu cm as moisture content of the paste preparation was increased from 65 to 87%. The increase in strength with number of contacts was linear, the strength of a single contact being about 0.0005 dynes. Hydrothermal processing produced a pore volume of about 1 cu cm/g with specimens dried to 10% moisture content, and 1.5-1.9 cu cm/g with 57% moisture content. With an increase in the temperature of hydrothermal working, surface area decreases, pore radius increases, and uniformity of structure remains the same. Alkali metal impurities decrease the thermal stability of the silica gel. Mechanical strength of specimens not worked hydrothermally was found to increase linearly with roasting from 110 to 900 C; hydrothermally worked specimens underwent little change.

4056 APTIC NUMBER 13009

Eastman, E.D.
REVISION OF THE FREE ENERGY OF FORMATION OF SULPHUR DIOXIDE. Dept. of Commerce, Bureau of Mines, I.C. 6454, 7p., April 1931.

Greater accuracies in the measurement of the heat of formation of SO2 and the specific heat of S gas allow a new and more accurate determination of the free energy of SO2. The equations for the specific heats of rhombic S, gaseous S, O, and SO2, required for the calculation, are given. The heat capacity of S gas was previously taken to be equal to that of O, but is given separate treatment in the present determination. When the characteristic frequency of vibration of a diatomic molecule in the lowest state is known, it is possible to represent its vibrational specific heat approximately by means of the corresponding Einstein function. In the case of S gas, the first quantum jump in vibration is approximately known from calculations based on spectral data. Taking this jump as 0.089 volt-equivalent, the corresponding Einstein function gives the vibrational heat capacity for any temperature. The total heat capacities are then obtained by adding the desired values to 7/2 R, the molal heat capacity at constant pressure of a diatomic gas with rotational degrees of freedom fully excited. The basic free energy equation is obtained from this data and the oxidation reactions of both rhombic and gaseous S. The integration constant is determined from previous equilibrium studies on H2O vapor, liquid S, H2S, and SO2 systems. The three revised equations are given. The revised free energy of formation of SO2 is given as -79,580 cal. This is recommended for temporary and immediate use, but may be subject to further correction when the thermodynamics of the reaction Cu2S + 2Cu2O yields 4Cu + SO2 has been satisfactorily discussed.

4057 APTIC NUMBER 13210

Ehrlich, H. L.
BACTERIOLOGY OF MANGANESE NODULES. II. MANGANESE OXIDATION BY CELL-FREE EXTRACT FROM A MANGANESE NODULE BACTERIUM. Appl. Microbiol., 16(2):197-202, Feb. 1968. 11 refs.

A cell-free extract from Arthrobacter 37, isolated from a manganese nodule from the Atlantic Ocean, exhibited enzymatic activity which accelerated manganese accretion to synthetic Mn-Fe oxide as well as to crushed manganese nodule. The reaction required oxygen and was inhibited by HgCl2 and p-chloromercuribenzoate, but not by Atebrine dihydrochloride. The rate of enzymatic action depended on the concentration of cell-free extract used. The enzymatic activity had a temperature optimum around 17.5 C and was destroyed by heating at 100 C. The amount of heat required for inactivation depended on the amount of nucleic acid in the preparation. In the cell-free extract, unlike the whole-cell preparation, peptone could not substitute for NaHCO3 in the reaction mixture. An enzyme-containing protein fraction and a nucleic acid fraction could be separated from cell extract by gel filtration, when prepared in 3% NaCl but not in seawater. The nucleic acid fraction was not required for enzymatic activity. (Author abstract modified)

4058 APTIC NUMBER 13299

Eisenbraun, Edgar W.
THE SEPARATION AND FRACTIONATION OF LIGNOSULFONIC ACIDS FROM SPENT SULFITE LIQUOR WITH TRI-N-HEXYLAMINE IN ORGANIC SOLVENTS. Tappi, 46(2):104-107, Feb. 1963. 21 refs.

An experimental procedure for the separation of lignosulfonic acids from spent sulfite liquors by extraction with tri-n-hexylamine in organic solvents is described. The extraction removed practically all lignosulfonic acids leaving the reducing sugars and some acidic carbohydrates in the aqueous phase. Lignosulfonic acids in the extract were fractionated according to increasing molecular weight and phenolic content by stepwise back extraction with aqueous sodium bicarbonate. About 10% of the lignosulfonic acids, having a high phenolic content and a low molecular weight, tended to be retained in the amine solution, and these were extracted last. (Author abstract)

4059 APTIC NUMBER 13269

Eliasson, Eva
REPRESSION OF ARGINASE SYNTHESIS IN CHANG LIVER CELLS. Exp. Cell Res., vol. 48:1-17, Oct.-Dec. 1967. 33 refs.

A rapid increase in specific arginase activity occurred in Chang liver cells immediately after addition of the missing nutrient to cells preincubated in a medium from which one essential amino acid had been omitted. The rapid change in enzymic activity offered an opportunity for studying specific enzyme regulation during short duration experiments. The experimental results indicate that the increase in specific arginase activity, which could be immediately stopped by the addition of puromycin, was due to a more rapid synthesis of the enzyme than in normally growing cells. Actinomycin D, at concentrations sufficient to inhibit DNA-directed RNA synthesis, did not prevent the increase in arginase activity, suggesting that the synthesis of the enzyme took place in response to a preformed stable messenger RNA. A few hours after the addition of the missing nutrient to a prestarved culture, arginase synthesis was again retarded. This decrease in the rate of enzyme formation could be prevented by addition of actinomycin D. When proline was added to the culture medium, the decrease in the rate of enzyme formation was enhanced. When proline was added to the deficient medium during the starvation period, the increase in arginase activity immediately after the addition of the missing nutrient was partially prevented. An increased rate of arginase formation was produced when these cells, prestarved in presence of proline, were transferred to a 'normal' growth medium without added proline. This stimulation of arginase synthesis, brought about by the removal of proline, was not prevented by the addition of actinomycin D and therefore seemed not to be dependent of a formation of new messenger RNA. These results suggest a proline-dependent repression of arginase synthesis at the level of translation of a preformed, stable messenger RNA. Mechanisms for the regulation of Arginase activity are suggested. (Author summary modified)

4060 APTIC NUMBER 13104

Engel, Rolf R., F. Lee Rodkey, John D. O'Neal, and Harold A. Collison
RELATIVE AFFINITY OF HUMAN FETAL HEMOGLOBIN FOR CARBON MONOXIDE AND OXYGEN. Blood, 33(1):37-45, Jan. 1969. 22 refs.

Fetal blood samples were obtained, and hemoglobin was equilibrated with carbon monoxide and oxygen. Results showed human placental blood has a lower relative affinity for CO than adult blood. By correcting the fraction of hemoglobin A (adult) in placental blood, it was calculated that hemoglobin F (fetal) has a relative affinity constant (K) of 172 + or - 12, which is approximately 20% less than the K of hemoglobin A. (Author summary modified)

4061 APTIC NUMBER 13239

Erman, William F. and W. I. Lyness
THE ISOLATION, PURIFICATION, AND STRUCTURE DETERMINATION OF A PHENOLIC ACID FRACTION FROM SLASH PINE BARK. Tappi, 52(4):249-256, April 1969. 29 refs.

A method for the isolation of phenolic acid from slash pine (Pinus elliottii Engelm.) bark and its conversion to a relatively homogeneous methylated phenolic acid derivative, II, is described. The results of alkaline fusion, pyrolysis, oxidation, and reduction experiments combined with spectoscopic evidence suggest that II is a polymer of substituted catechin-type units. Functional group analysis and molecular weight determinations indicate the empirical formula $(C_{15}H_{11}O_4(COCH_3)_3)_{17}$ for II. A partial structure is proposed, but has not been confirmed, as the principa repeating unit of the methylated phenolic acid derivative, II. (Author abstract modified)

4062 APTIC NUMBER 13149

Faber, John H.
COAL'S GENERATION PRIMACY HINGES ON FLY-ASH SALES. Elec. World, 171(17):44-45, April 28, 1969.

The future use of coal as the prime fuel for generating electricity is threatened today by the rising cost of fly-ash disposal. This cost reached $2/ton in 1969 in many areas and is steadily rising, particularly in urban areas. The problem is further aggravated by the increased efficiency of fly-ash collection in response to the demand for cleaner air. The economic loss associated with disposal can be overcome by using fly-ash for beneficial purposes. It has already been established as a beneficial ingredient in concrete, bituminous concrete fillers, and grouting. Developments are being pursued for its use in lightweight aggregate, soil stabilization, and agricultural applications. New building materials, including fly-ash brick, are under development. Probably the largest fly-ash use in the U.S. is in mass concrete for dam construction. Concrete paving offers a potential market. This market would have greater promise if state and county specifications did not make the supplier liable for results. Sale of fly-ash to manufacturers of concrete blocks, pipe, and slabs is a continuing market and would help to relieve the seasonable variations common to other concrete-using industries. Soil stabilization offers a large fly-ash market. Stabilizing agents are needed in the construction of base courses for roads,

parking areas, airport runways, and foundations. Used as a lightweight aggregate, fly-ash offers many advantages over clay and shale.

4063 APTIC NUMBER 13329

Feldman, Fredric J. and Robert F. Bosshart
A SEMI-QUANTITATIVE METHOD FOR THE DETERMINATION OF MICROGRAM AMOUNTS OF MANGANESE ON MILLIPORE FILTERS. Anal. Chim. Acta, 37(1):122-126, Jan. 1967. 4 refs.

A method is described in which the intensity of coloration of brown manganese dioxide on white Millipore filters was used to measure manganese content. The manganese was first oxidized to the heptavalent state with potassium persulfate in neutral solution and then precipitated by Volhard reaction with addition of excess manganese (II). Several disadvantages such as decomposition of permanganate impurities, slight iron interference, and occasional recoveries exceeding 100% were observed. During this investigation, a manganese dioxide precipitate formed in highly basic solutions of manganese (II) and would not dissolve after addition of large amounts of nitric acid. These findings indicated that it was possible to precipitate and collect the manganese dioxide without going through the time-consuming persulfate oxidation steps. This method would also eliminate losses due to reduction of the permanganate by impurities. Rapidity, absence of instrumentation, ease of operation, and no need to minimize volumes were advantages. Optimum conditions, mechanism, effects of some metal ions, and methods for increasing sensitivity were discussed.

4064 APTIC NUMBER 13274

Fendell, Francis E.
ASYMPTOTIC TREATMENT OF PREMIXED FLAME STRUCTURE WITH DIFFUSION. AIAA (Am. Inst. Aeron. Astronaut.) J, 5(4):808-809, April 1967. 7 refs.

A suggestion is presented that the inner-and-outer technique for matched asymptotic expansion, might be useful in quickly characterizing some one-dimensional plane steady laminar flame problems within the limits of nearly equilibrium and nearly frozen flow. A Lewis-number-unity mixture of ideal gases was considered in the absence of radiation, body forces, barodiffusion, or thermal diffusion. Attention was confined to finding the mass fraction for a direct one-step exothermic reaction of order greater than one. This was done from several adopted approximate reactions. By treating a planar geometry, an arbitrary-order reaction in a compressible, variable-property flow might be discussed quite readily. For a spherical droplet geometry, only a first-order decomposition in an incompressible constant property flow was convenient for closed-form solution. Observations were achieved about the thickness of the reaction zone and the relation between the reaction order and the magnitude of reactant. Continuum theory was based on the assumption that appreciable changes in the department variable occur over distances much greater than the local mean free path.

4065 APTIC NUMBER 13282

Pennell, F. I. and W. J. Stalter
ADVANTAGES OF HYDROGEN PEROXIDE FOR BLEACHING KRAFT PULP. Southern Pulp Paper Mfr., 30(9):92, 94, Sept. 10, 1967.

Du Pont is one of the nine U.S. kraft mills bleaching with peroxide to stabilize pulp brightness after heat aging. In the six-stage process used, the peroxide stage is preceded by one chlorine dioxide stage in the sequence chlorination-extraction-hypochlorite-chlorine dioxide-peroxide (CEHDP). A competitive method is the six-stage chlorination-extraction-hypochlorite-chlorine dioxide-extraction-chlorine dioxide (CEHDED) process. Comparative tests show that the EDP sequence increases pulp air-dry brightness from 88 to 91 and oven-dry brightness from 88 to 90. With the DED, process the brightness is 90 air-dry and 87.5 oven-dry. The 1967 cost for 90 oven-dry brightness with peroxide is $1.50 a ton above the peroxide bleaching costs for 88 oven-dry pulp. This advantage of two points in oven-dry brightness for the CEHDP process over the CEHDED sequence is the main reason for a peroxide process.

4066 APTIC NUMBER 13285

Fernando, J., F. Enser, S. Pontremoli, and B. L. Horecker
PURIFICATION AND PROPERTIES OF RABBIT MUSCLE FRUCTOSE 1,6-DIPHOSPHATASE. Arch. Biochem. Biophys., 126(2):599-606, Aug. 1968. 22 refs.

The purification of rabbit muscle fructose 1,6-diphosphatase (FDPase) by acid and ammonium sulfate fractionation is described. The purified enzyme is activated by either Mg(2+) or Mn(2+), and, like the rabbit liver enzyme, utilizes both fructose 1,6-diphosphate (FDP) and sedoheptulose 1,7-diphosphate as substrates. Its cation requirements, pH profile, and substrate inhibition are also similar to FDPases from rabbit liver. The muscle enzyme did not require ethylenediaminetetraacetic acid (EDTA) for activity, although this condition has been reported by previous investigators. It is active at very low concentrations of fructose-1,6-diphosphate and is 1000 times more sensitive to inhibition by adenosine monophosphate than the liver enzyme. Despite resemblances in their catalytic properties, the liver and muscle enzymes are probably two different proteins.

4067 APTIC NUMBER 13686

Fischer, Hans
COMPARATIVE STUDY OF THE ADSORPTION OF GASES ON CHARCOAL IN SOLUTION. (Vergleichende Untersuchung uber die Adsorption an Holzkohlen in Losung und in Gasen). Text in German. Kolloid-Beih., 42(4-2):125-183, 1935. 17 refs.

The adsorption capacity of eleven types of coals in solution was determined. The amount adsorbed during equilibrium conditions and during a certain period of time, as well as the adsorption speed, were determined each time. Prior to the tests, the purity of the coals was determined. For the study of adsorption in solution, succinic acid in aqueous solution, iodine in aqueous KI solution, iodine in alcoholic solution, and methylene blue in aqueous solution, and the gases SO2, CO2, and C2H4 were used. Dry carbon was mixed with one of the above substances in solution, shaken, and after some time the concentration was determined by titration. With gases, the adsorbed amount was determined by measurement of the pressure difference caused by adsorption. It was found that in solution all types of coals reached the adsorption equilibrium slowly. The adsorption speed depended very much on the grain size of the carbon particles; the larger the particles, the lower the adsorption speed. Porous coal adsorbed rapidly, dense coals slowly. Succinic acid was adsorbed best, methylene blue least. The adsorption capacity of porous coal in solution was higher than that of dense or indistinct coal. The same results were obtained for the adsorption of SO2 vapor. With C2H4 and CC2, however, the dense coals had a higher adsorption capacity than the porous ones. The adsorption speed was higher with gases owing to the higher molecular motion of gases. It was concluded that the various types of coals showed no markedly different adsorption properties. Greater difference existed only between impure, tarry ordinary retort coal and activated tar-free coals.

APTIC NUMBER 13948

4068

Poerster, P., T. Burchardt, and E. Fricke
PRODUCTION OF CONCENTRATED NITRIC ACID FROM NITROUS GASES. PARTS A AND B. (Ueber die Gewinnung konzentrierter Salpetersaeure aus nitrosen Gasen). Text in German. Z. Angew. Chem. (Weinheim), vol. 1:113-117, May 11, 1920. PARTS C, D, AND E. Ibid., p. 129-132, May 25, 1920. 10 refs.

A detailed description and discussion is presented of two series of experiments on the formation of nitric acid from nitrous gases. In the first series, a mixture of gaseous nitrogen dioxide and oxygen was passed through a bell-type wash tower filled with a nitric acid solution. In the second series, oxygen was passed through a mixture of nitric acid and liquid nitrogen dioxide or else known amounts of oxygen and that mixture were thoroughly shaken together. Conclusions are as follows: 1. The notion derived from previous experiments that the process of nitric acid formation from gaseous NC2, O2, and water cannot proceed beyond the nitric acid solution with the lowest vapor pressure, is erroneous. 2. The rate of this process in the range of concentrations of nitric acid at the lowest vapor pressure is so low that an enrichment of nitric acid beyond this range requires a rather long reaction time. 3. For such an enrichment, the smallest possible excess of oxygen and a low rate of flow of the mixture are preferable. 4. With sufficiently long test durations and with progressively decreasing utilization of the NO2, even under the most favorable test conditions, nitric acid concentration rarely goes above 80%. 5. The reason for this is that when a stearing gas mixture is used, the conditions favoring a good utilization of NO2, namely, a small oxygen excess and low rate of flow, are highly unfavorable for the thorough mixing of the reaction solution with oxygen which is also required. 6. However, one can easily attain even the highest nitric acid concentrations if one mixes less concentrated solutions of it with an appropriate amount of liquid NO2 and shakes this mixture thoroughly with oxygen. 7. The process proceeds especially rapidly when the excess of liquid NO2 is so great that, due to its limited solubility in nitric acid, the liquid mixture is heterogeneous and remains so during the reaction. 8. When nitrous gases act on water, from the equilibrium 2NO2 yields N2O4, the latter is dissolved in water and yields the primary reaction N2O4 plus H2O yields HNO3 plus HNC2. 9. The dissociation of the nitrous acid into nitric acid, nitric oxide, and water (3HNC2 yields HNO3 plus 2NO plus H2O), and the rapid oxidation of the latter, effects the transformation of the nitrous gases into nitric acid up to its highest concentrations.

APTIC NUMBER 12172

4069

Hilis O. Folkins, and Elmer L. Miller
ROLE OF THE CATALYST IN THE REACTION OF AICCHOLS AND HYDROGEN SULFIDE. Preprint, 9p., 1962. 15 refs. (Presented at the Session on Processes during the 27th Midyear Meeting of the American Petroleum Institute's Div. of Refining, in the Fairmont Hotel, San Francisco, Calif., May 15, 1962.)

The main products formed in the high-temperature catalytic reactions of aliphatic alcohols and hydrogen sulfide are the corresponding mercaptans and sulfides. Minor amounts of other compounds such as ethers, aldehydes, and olefins are also produced. The reaction can be controlled to produce either mercaptan or sulfide by judicious choice of catalyst composition. Operating conditions play an important but secondary role in product distribution. Catalysts including alkali metal salts and oxides incorporated with activated alumina and similar supports promote mercaptan formation almost exclusively, whereas acidic-type catalysts favor sulfides as the product. The effects of general composition, promoter concentration, and the nature of the catalyst support upon activity and selectivity are discussed for reactant alcohols from methanol through octanol. Processes for both mercaptan and sulfide production have resulted from these catalyst studies. (Authors' abstract)##

APTIC NUMBER 13574

4070

Foster, E. Gordon and Farrington Daniels
RECOVERY OF NITROGEN OXIDES BY SILICA GEL. Ind. Eng. Chem., 43(4):986-992, April 1951. 10 refs.

Work was undertaken to develop an economical process for the recovery of the 1 to 1.5% nitric oxide produced by a thermal process for the fixation of atmospheric nitrogen which was developed at the University of Wisconsin. Basic

data are presented for the dehydration and adsorption steps of a recovery process involving cooling of the product gas from the fixation furnace in a spray tower, dehydration of the gas in silica gel dryers, catalytic oxidation of the NO to NO2, and NO2 concentration by adsorption on and desorption from silica gel. A method for correlation of the rate of NO adsorption on silica gel was of great interest. The effects of silica gel depth, temperature, particle size, and gas velocity on rates of adsorption are described. Diffusion of the adsorbed NO into the solid adsorbent may be the rate-controlling step.

4071 APTIC NUMBER 13835

Fraser, Thomas and William L. Crentz
WASHING CHARACTERISTICS OF THE PITTSBURGH COAL IN A HIGH-SULFUR AREA IN GREENE COUNTY, PA. Bur. Mines Tech. Paper 689. Bureau of Mines, Washington, D. C., 1946, 85p. 13 refs.

Approximately 90% of the Pittsburgh-seam coal remaining in Pennsylvania occurs in the southwestern portion of the state in Greene and Washington counties and is regarded as the principle source of metallurgical fuel for the Pittsburgh industrial area. This coal is known to be high in S content, generally increasing toward the west. The Bureau of Mines undertook an intensive study of the characteristics of the coal in a typical area of Greene county to obtain more information about the nature of the S. Channel, and sometimes bench, samples were taken from seven working areas of a typical mine in the area. The samples were float- and sink-tested at specific gravities (sg) of 1.35, 1.45, and 1.60. Sulfur determinations were also made. A variation of S content of the samples between 0.93 and 3.37% was found. Local groups of samples showed that distances as small as 100 ft have considerable effect on S content. A larger portion of the S in high-S samples was in the organic and finely disseminated pyritic forms, indicating that peaks of high-S coal will not be leveled to any great extent by washing. Only coal from below the bearing-in bands responds favorably to washing. Crushing before separation brought about no substantial improvement in S reduction unless the coal was crushed to 28-mesh or finer. Separate handling of the coal from the working places that produce coal of low float-S content would make it possible to produce a washed coal of 1.30% S content by washing at 1.6 sg. The yield of this grade would be 56.6% of the run-of-mine coal, leaving 40.5% from high-S places to be used as high-S steam coal. The largest yield of low-S coal would be obtained by separate washing at 1.35 sg. Practical application of this scheme must wait for the development of a washing process that will operate efficiently at low gravity.

4072 APTIC NUMBER 13909

Freeman, Eli S.
THE KINETICS OF THE THERMAL DECOMPOSITION OF POTASSIUM NITRATE AND OF THE REACTION BETWEEN POTASSIUM NITRITE AND OXYGEN. J. Am. Chem. Soc., vol. 79:838-842, Feb. 20, 1957. 9 refs.

The kinetics of the thermal decomposition of potassium nitrate were studied in oxygen, at a constant pressure of one atmosphere, over a temperature range of 650-800 C. The rate of reaction was followed by observing changes in volume as a function of time. From 650-750 C, the products of decomposition were potassium nitrite, oxygen, and traces of nitrogen dioxide. Equilibrium was attained between KNO3, KNO2, and oxygen. At 800 C, decomposition was more extensive; potassium nitrite decomposed to form nitrogen, oxygen, and potassium oxide. The reaction between potassium nitrite and oxygen was investigated by measuring the rate of consumption of oxygen to form potassium nitrate. From 550-600 C, the reaction goes slowly to completion; from 650-750 C, equilibrium was attained; at 790 C, decomposition of potassium nitrite was evident. The equilibrium constants were calculated from the data and on the basis of their temperature dependence, the heats of reaction for decomposition and oxidation were determined. A four-step mechanism was proposed in the following sequence: KNO2 plus O2 yields KNO3 plus O; KNO2 plus O yields KNO3; KNO3 yields KNO2 plus O; and KNO3 plus O yields KNO2 plus O2. The energies of activation for the decomposition of KNO3 and for the reaction of KNO2 and oxygen and the corresponding frequency factors further confirm the suggested mechanism involving the initial reaction between nitrite and molecular oxygen, since an activation energy which is approximately equal to the dissociation energy of oxygen would be required if the primary step of the oxidation process involved the dissociation of molecular oxygen.

4073 APTIC NUMBER 13987

Fuller, Robert R.
THOUGHTS ON THE LIQUOR CYCLE AND CAUSTICIZING. Southern Pulp Paper Mfr., 29(1):70-71, 74, 76, 78, Jan. 10, 1966.

In addition to sodium hydroxide and sodium sulfide, kraft cooking reactions are influenced by sodium sulfate, sodium carbonate, thiosulfate, and polysulfide components. The practice of reporting green and white liquor compounds in terms of sodium monoxide, as followed by the Forest Products Laboratory tests, does not produce accurate analyses of kraft cooks. Not only cooking and washing operations, but other steps in the recovery cycle will vary as the components vary in relation to each other and in total. The dilution used at the digester and the ability of the total solution to absorb more solids are other operating variables. The fiber slurry is also affected by residual chemicals. The key to controlling these variables is the efficiency of the causticizing operation through which sodium carbonate is converted to sodium hydroxide. Concentration has been found to be the major factor controlling conversion efficiency. Hydroxide and sulfite will reduce the efficiency to the extent that they contribute to the concentration, and as they affect the equilibrium. Excess lime and good lime slaking improve efficiency. It is suggested that attainable laboratory conversions of sodium carbonate to hydroxide should be investigated under varying conditions of time and excess lime. The economics of the causticizing system should also be studied.

4074 APTIC NUMBER 13193

Furchner, J. E., C. B. Richmond, and G. A. Drake
COMPARATIVE METABOLISM OF RADIONUCLIDES IN MAMMALS. III. RETENTION OF MANGANESE-54 IN THE MOUSE, RAT, MONKEY AND DOG. Health Phys., vol. 12:1415-1423, 1966. 24 refs.

Radiomanganese (Mn 54) was administered to mice and rats by the oral, intravenous and intraperitoneal routes and to dogs and monkeys by the oral and intravenous routes. Whole-body counting techniques, utilizing 4pi liquid scintillation counters, were used to determine whole-body retention parameters. Retention functions consisting of the sum of three or four exponential expressions were adequate descriptions of retention until the body burden was less than 1% of the administered dose. The longest effective half times after intravenous injections were 119, 146, 99 and 68 days for mice, rats, monkey, and dogs, respectively. Tissue distribution studies in rats showed that, for most tissues, concentration as a function of time roughly paralleled whole-body retention. Both bone and brain had a slower rate of loss than other tissues. Using a parabolic relation between body weights and the integrals of the retention functions, it was estimated that 0.006 microcurie/ml was the maximum permissible concentration in water (MPC-w) when the total body is the critical organ. This value is in good agreement with the current International Commission on Radiological Protection value of 0.008. However, the value calculated for the lower large intestine (0.001 microcurie/ml) must remain the MPC-w for Mn-54. (Author abstract modified)

4075 APTIC NUMBER 13250

Furuya, Akira, Shigeo Abe, and Shukuo Kinoshita
PRODUCTION OF NUCLEIC ACID-RELATED SUBSTANCES BY FERMENTATIVE PROCESSES. XIX. ACCUMULATION OF 5'-INOSINIC ACID BY A MUTANT OF BREVIBACTERIUM AMMONIAGENES. Appl. Microbiol., 16(7):981-987, July 1968. 11 refs.

The accumulation of 5'-inosinic acid (IMP) by a mutant, KY 13102, induced from Brevibacterium ammoniagenes ATCC 6872 by ultraviolet light irradiation, was examined. Although growth was stimulated by adenine or adenosine, the microorganism showed fair growth in the medium containing amino acids but no adenine. Among six kinds of natural nutrients tested, meat extract and Casamino Acids were suitable for the accumulation of IMP. Manganese ion strongly affected growth, the accumulation of IMP and hypoxanthine, and cell morphology. Among amino acids tested, L-methionine, L-proline, and L-valine stimulated IMP accumulation. In the medium containing 1.0 g of L-proline per liter, 12.8 mg of IMP per ml was accumulated. The mechanism of IMP accumulation by the mutant is discussed. (Author abstract)

4076 APTIC NUMBER 13688

Ganz, S. N. and N. A. Lokshin
EFFECT OF BASIC PHYSICOCHEMICAL FACTORS ON RATE OF ABSORPTION OF NITROGEN OXIDES BY A SOLUTION OF CALCIUM HYDROXIDE IN MECHANICAL ABSORBERS WITH A LARGE NUMBER OF ROTATIONS. PART II. (Vliyaniye osnovnykh fizikokhimicheskikh faktorov na skorost' absorbtsii okislov azota rastvorom Ca(OH)2 v mekhanicheskikh absorberakh s bol'shim chislom oborotov. Soobshcheniya II). Text in Russian. Zh. Prikl. Khim., 30(10):1525-1535, Oct. 1957. 6 refs.

New data on the effect of basic physicochemical factors on the rates of NO, NO2, and N2O3 absorption by Ca(OH)2 solution are presented. It is established that: absorption rate decreases at temperatures above 45-50 C; an increase in concentration of nitrogen oxides under the hydrodynamic conditions studied leads to acceleration of the absorption process; in the absence of nitrite-nitrate salts, a change in CaO concentration has practically no effect on process rate; in all cases an increase in concentration of nitrite-nitrate salts reduces the absorption rate, an increase in CaO concentration retarding the decrease in absorption rate in this case. It is established that absorption of N2O3 and NO2 proceeds at practically the same rate under turbulent conditions. Preferential accumulation of nitrate salts in the solution indicates rapid oxidation of NO to NO2 taking place in the liquid phase and the occurrence of an inversion process under the experimental conditions used.

4077 APTIC NUMBER 13685

Ganz, S. N. and L. I. Mason
KINETICS OF FILM ABSORPTION OF NITROGEN(II) OXIDE BY FESO4 SOLUTIONS. (Kinetika plenochnoy absorbtsii okisi azota rastvorami FeSO4). Text in Russian. Zh. Prikl. Khim., vol. 30: 369-379, 1957. 5 refs.

The kinetics of film absorption of NO by FeSO4 solutions was studied experimentally in order to establish the nature of the driving forces of the process as a function of change in sorbent concentration and partial pressure of the absorbing component. It was found that at relatively low concentrations of NO in the gas and a gas flow speed of 0.1-1 m/sec, the NO absorption coefficient increases as the 0.8 power of the gas speed. The total absorption coefficient may be taken equal to the partial coefficient (Kg) along the gas film, since the resistance of the latter is the process-limiting factor. An empirical kinetic equation expressing Kg as a function of the gas Reynolds number is given in dimensionless form and is suitable for designing industrial absorption equipment.

4078 APTIC NUMBER 13364

Garibyan, T. A., A. A. Mantashyan, and A. B. Nalbandyan
FORMATION OF PEROXIDE RADICALS DURING PHOTOCHEMICAL OXIDATION OF HYDROCARBONS. (K obrazovaniyu perekisnykh radikalov pri fotokhimicheskom okislenii uglevodorodov). Text in Russian. Arm. Khim. Zh. (Erevan), 22(4):285-287, 1969. 3 refs.

A previously described apparatus for electron paramagnetic resonance determination of radicals formed from hydrocarbons

was modified to determine whether the peroxide radical was formed from the free alkyl radical according to the equation R plus O2 yields RO2 or heterogeneously on the cold surface. It was shown that the peroxide radicals were formed just in the zone of the gas phase reaction.

4079 APTIC NUMBER 13633

Gehlen, Heinz
ON REACTIONS AND PROPERTIES OF NITRIC OXIDE AND ITS COMPOUNDS. I. ON THE REACTION BETWEEN NITRIC OXIDE AND SODIUM HYDROSULFITE. (Ueber Reaktionen and Eigenschaften des Stickoxyds und seiner Verbindungen, I. Mitteil.: Uber die Einwirkung des Stickoxyds auf Natriumhydrosulfit.) Text in German. Chem. Ber., 64:1267-1276, 1931. 20 refs.

The method of Jellinek for preparing pure sodium hydrosulfite has been improved. By this simple laboratory process, 98.5% pure Na2S2O4, free of chloride, can be obtained. Commercially available Na2S2O4 can be purified without elaborate filtering. The process is described in detail, including all wet chemical checks for purity. One mole of Na2S2O4 in aqueous solution absorbs 4.31 moles of NO. The chemical reactions taking place are: Na2S2O4 plus 6NO plus 2NaOH yields Na2SO3.N2O2 plus Na2SO4 plus 2N2O plus H2O; and to a lesser degree, Na2S2O4 plus 6NO plus 2NaOH yields 2Na2SO3.N2O2 plus N2O plus H2O.

4080 APTIC NUMBER 13273

Gerhardt, Bernt and Wolfgang Wiessner
ON THE LIGHT-DEPENDENT REACTIVATION OF PHOTOSYNTHETIC ACTIVITY BY MANGANESE. Biochem. Biophys. Res. Commun., 28(6):958-964, 1967. 9 refs.

It has been established that reactivation of photosynthetic activity by manganese requires light. The necessity of light for the reactivation is not due to a light-dependent manganese uptake. It was found that if Anacystis nidulans cells are preincubated with manganese in the light or dark, subsequent illumination leads in both cases to reactivation. If, however, the cells are freeze-dried after preincubation with manganese, the reactivation takes place only when the algae have been preincubated in the light. These results indicate the necessity of the photosystem II to restore photosynthetic activity in manganese-deficient Anacystis by manganese. It is believed that Mn(2+) must be oxidized in a light-dependent process. The dependency of reactivation on different wavelengths characteristic of photosystem II is presented in tabulated form.

4081 APTIC NUMBER 13123

Giammona, Samuel T. J.
PULMONARY SURFACTANT AND RESPIRATORY DISTRESS. GP (J. Am. Acad. Gen. Pract.), 39(6):86-90, June 1969.

Respiratory distress syndrome (RDS) is the chief cause of death in the perinatal period. Although the etiology has not been established, there appears to be a deficiency of pulmonary surfactant factor. The surfactant is normally formed at the time that osmophilic inclusions appear on the alveolar walls. The material has not been completely identified, but is characterized as containing phospholipids and formed from palmitic and acetic acids. Lack of the surfactant results in alterations in surface tension, decreased compliance, and a tendency to atelectasis. Other conditions with abnormal surfactant activity include inadequate pulmonary circulation, pneumonitis, and lung homotransplantation. Specific treatment for this abnormality is not yet available. (Author abstract modified)

4082 APTIC NUMBER 13418

Gierer, Josef, Bernard Lenz, and Nils-Rakar Wallin
THE SPLITTING OF ARYL-ALKYL ETHER BONDS IN MILLED WOOD LIGNIN BY WHITE LIQUOR. PART VII. OF A SERIES ON THE REACTIONS OF LIGNIN DURING SULFATE COOKING. TAPPI, 48(7):402-405, July 1965. 14 refs.

Milled wood lignin from Picea abies and variousus methylated modifications were treated with white liquor at 170 C for different lengths of time, and the resulting materials were analyzed for free phenolic hydroxyl groups. The results show that white liquor splits aryl-ether bonds present in lignin at a higher rate and to a slightly greater extent than 2N NaOH, used as a splitting reagent in a previous investigation of this series (Gierer, Lenz, Noren, and Soderber, TAPPI, 47:233, 1964). The higher rate of aryl-ether splitting by white liquor may be ascribed to the stronger nucleophilicity of the hydrosulfide ions as compared with hydroxyl ions. The more extensive methylether cleavage during sulfate cooking is indicative of this difference. However, the favorable effect of hydrosulfide ions on the splitting of aryl-ether linkages may also be partly explained by assuming an intermediate incorporation of these ions into lignin at carbon atoms adjacent to aryl-ether bonds and an alkaline splitting of the resulting mercapto-alkyl-ether structures via episulfide intermediates. These hypotheses are in accord with model studies which indicate that a possible pathway involves addition of hydrosulfide ions to methylene quinone structures and confirming the ease of splitting mercapto-alkyl-aryl ethers by alkali. (Authors' abstract modified)

4083 APTIC NUMBER 13941

Ginstling, A. M., and A. D. Volkov
ELEMENTAL SULFUR FORMATION DURING REACTION OF CALCIUM SULFATE WITH CARBON. (O reaktsiyakh obrazovaniya elementarnoy sery pri vzaimodeystvii sul'fata kal'tsiya s uglerodom). Text in Russian. Zh. Prikl. Khim., vol. 33:1700-1704, 1960. 25 refs.

The change in Gibbs free energy for the system CaSO4 - C over the temperature range 700-1100 C was determined for six reaction

equations using the method of Temkin and Shvartsman. Results based on data from the literature are both tabulated and plotted graphically and reveal that under practical conditions, elemental sulfur is produced mainly by the reduction of SO2 by carbon and its oxides.

4084 APTIC NUMBER 13129

Glass, H. I., R. H. T. Edwards, A. C. De Garreta, and J. C. Clark
C-11-O RED CELL LABELING FOR BLOOD VOLUME AND TOTAL HEMOGLOBIN IN ATHLETES: EFFECT OF TRAINING. J. Appl. Physiol., 26(1): 131-134, Jan. 1969. 20 refs.

Blood volume and total hemoglobin were measured in 10 male racing cyclists with a C-11-O red cell labeling technique. Venous blood (5 ml) was equilibrated with C-11-O and subsequently reinjected. The distribution volume was estimated for each of five timed blood samples, and an empirically selected single exponential function fitted to the data and the instantaneous dilution volume for C-11-O-labeled red cells were calculated. The average blood volume of the group was 82.6 = or - 4.2 ml/kg and the average total hemoglobin 10.6 = or - 0.7 g/kg. The average coefficient of variation in the estimation of the C-11-O dilution space was = or - 3.4%. Estimation from a single timed sample instead of five samples did not significantly increase the error. The error in blood volume was estimated to be = or - 5.2% and = or - 6.2% for total hemoglobin. In five subjects after a 2-month intensification of training resulting in improved working capacity, there was no significant change in C-11-O space, total hemoglobin, or blood volume. This has been attributed to the high degree of physical fitness of the subjects at the start of the study. (Author abstract modified)

4085 APTIC NUMBER 13791

Glavachek, V., M. Marek, and M. Korzhinkova
KINETICS OF THE CATALYTIC REACTION OF CARBON MONOXIDE WITH WATER VAPOR. Kinetics Catalysis (USSR) (English transl.), 9(5 part 2): 912-915, Sept.-Oct. 1968. 21 refs.

A statistical analysis of experimental data on the rate of reaction of CO and H2O by the method of nonlinear least squares is reviewed. Twenty-two equations for the rate of reaction proposed by various workers are tabulated. The constants in each of these equations were determined by the least squares method. A residual dispersion was calculated for each correlation. The data for each temperature were first treated separately, and then the data for all temperatures were treated together. The results of the calculations are tabulated. The individual models were compared in terms of the residual dispersion. Fourteen of the proposed equations gave a 95% correlation, six gave the same dispersion, and only two gave good correlation. It is recommended that the data for any one type of catalyst be handled by using a small number of preliminary measurements, followed by a primary statistical analysis of individual models based on quantitative concepts concerning the reaction mechanism. The preliminary data should be used to arrange further experiments so that the most suitable model can be selected.

4086 APTIC NUMBER 13073

Glazer, I.
ETIOLOGIC FACTORS OF BRONCHIAL ASTHMA IN ISRAEL. Intern. Arch. Allergy (Basel), 36(1-2):172-179, 1969. 30 refs. (Presented at the 7th Symposium, Colleg. Int. Allerg., Tel Aviv, 1968).

The significant etiologic factors of bronchial asthma in Israel are reviewed. Immigration seems to be one of the precipitating causes, probably through environmental (allergenic) changes and psychological stress. Different Jewish ethnic groups differ in their predisposition to asthma. The great variety of climates in Israel has a notable influence, particularly on those with seasonal asthma, partially because of different aerobiological conditions. Pollen of grasses (Gramineae) is the major cause of hay asthma; the main season being February to May, depending on the region. Pollen counts are very low in the Negev desert. Sagebrush (Artemesia), as well as some grasses, pollinate in the fall. Tree pollens are a minor factor, except for olive trees, which pollinate in May. Atmospheric mould spore varieties and seasonal changes are fairly uniform in all regions with peaks in the spring and the fall; the numbers, however, are markedly lower in the arid areas. (Author summary modified)

4087 APTIC NUMBER 13245

Glebov, R. N. and A. N. Mezentsev
BINDING OF METAL IONS WITH SYNAPTOSOMES AND CHOLINE RECEPTOR FRACTION ISOLATED FROM RAT BRAIN IN THE PRESENCE OF ACETYLCHOLINE. (Svyazyvaniye ionov metallov s sinaptosomami i kholinoretseptornoy fraktsiyey, vydelennymi iz mozga krys v prisutstvii atsetilkholina). Text in Russian. Biokhimiya, 33(3):521-526, 1968. 18 refs.

The binding of cations of elements from the nerve synapse with synaptosomes and choline receptor fraction isolated from rat brain tissue was studied. Binding powers with synaptosomes are arranged as follows: Ca(2=) greater than Cs(=) greater than or equal to K(=) greater than Rb(=) greater than Na(=) greater than Li(=) greater than Mn(2=) greater than Mg(2=). The order for the choline receptor fraction is: Ca(2=) greater than K(=) greater than Na(=) greater than or equal to Mg(2=) greater than Li(=) greater than Rb(=) greater than Mg(2=). The K(=)/Na(=) binding ratio is 1.6 for synaptosomes and 1.2 for choline receptor fraction. The K(=)/Na(=) binding ratio in both cases is 0.6 in the presence of acetylcholine. The presence of acetylcholine enhances the binding of Cs(=), Rb(=), Mg(2=), and Mn(2=) and supresses binding of Li(=), K(=), and Ca(2=) in both cases.

4088 APTIC NUMBER 13503

Glick, H. S., J. J. Klein, and W. Squire
SINGLE-PULSE SHOCK TUBE STUDIES OF THE KINETICS OF THE REACTION N2 PLUS O2 YIELDS 2NO (2NO YIELDS N2 PLUS O2) BETWEEN 2000-3000 K. J. Chem. Phys., 27(4):850-857, Oct. 1957.

The design of combustors for jet engines, the calculation of the properties of hypersonic flow fields, and the modification and improvement of chemical processes are among the problems requiring data on high chemical reaction kinetics. In the single-pulse shock tube method, developed at the Cornell Aeronautical Laboratory for processing a reactant gas sample with a single closely controlled, high temperature reactant gas, data on high temperature kinetics is obtained by analyzing 'debris' produced by the high-temperature pulse. The kinetics of nitric oxide formed in the temperature range 2000 to 3000 K were studied, using krypton, argon, and a mixture of argon-helium as diluents. The variation observed in the apparent activiation energy for k2 with different diluents indicated that the bimolecular mechanism is not dominant. When experiments were performed at constant room temperature (2580 K), it was observed that k2 varied as the inverse square root of the concentration of air. When an oxygen nitrogen mixture was used at a constant reaction temperature of 2500 K, the k2 varied inversely with the square root of the molecular oxygen concentration parallel Zeldovich's findings. The rate-determining step in the chain is: O plus N2 yields NO plus N, with deltaH2500 deg equals 75.8 kcal/mole. The reactivation energy for this step is 74 plus or minus 5 kcal/mole. The collision cross-section is 10 to the minus 16 power sq cm, which corresponds to a steric factor of about 0.05.

4089 APTIC NUMBER 13642

Golden, David M. and John I. Brauman
THERMAL UNIMOLECULAR ISOMERIZATION OF BICYCLO(2.1.0)PENT-2-ENE. Trans. Faraday Soc., 65, Part 2(554):464-469, Feb. 1969. 18 refs.

The gas phase unimolecular isomerization of bicyclo(2.1.0)pent-2-ene to cyclopentadiene was followed spectrophotometrically from 26.0 to 108.4 deg and at pressures from approximately 0.2 to 760 torr. The rate constants that were determined fit the Arrhenius equation. These parameters, as well as those for similar systems, are consistent with a transition state whose energy can be calculated from a biradical model. The parameters for this disrotatory process, when analyzed in contrast with those for the conrotatory isomerization of substituted cyclobutenes, yield a quantitative measure of the energy difference between orbital symmetry allowed and non-allowed processes. (Author abstract modified)

4090 APTIC NUMBER 13803

Goldman, Max, L. M. Canjar, and R. B. Beckmann
KINETICS OF CATALYTIC OXIDATION OF SULPHUR DIOXIDE FOR COMPARISON OF FIXED AND FLUID BED REACTORS. J. Appl. Chem., vol 7:278-284, May 1957. 20 refs.

The kinetics of the oxidation of sulfur dioxide to sulfur trioxide on a vanadia catalyst in confined and fluidized beds was investigated under various operating conditions. The reaction rates for both operations are correlated by an equation which assumes that surface reaction between activatedly adsorbed atomic oxygen and activatedly adsorbed sulfur dioxide is the rate-controlling step where mass transfer effects are negligible. Correlations of individual reaction rate data assume that adsorption equilibrium and reaction velocity constants are the same for both methods of gas-solid contact. The fluidized bed operation is shown to have an effectiveness factor 3 to 59 times greater than that for the confined bed operation. The data indicate that fluidized bed operations cannot be extrapolated to the confined bed even at low mass velocities. (Author summary modified)

4091 APTIC NUMBER 13456

Gordon, Julian and Fritz Lipmann
ROLE OF DIVALENT IONS IN POLY U-DIRECTED PHENYLALANINE POLYMERIZATION. J. Mol. Biol., 23(1):23-33, Jan. 14, 1967. 25 refs.

The activity of different divalent cations in the poly U-directed transfer of phenylalanine from phenylalanyl sRNA to polyphenylalanine was investigated. Highly purified protein fractions (ribosome-dependent GTPase and the protein fraction complements with ribosome-dependent GTPase in phenylalanine polmerization) and ribosomes were used. The order of activities Ca (II), Mg(II), Mn(II) was found. The products were confirmed as polyphenylalanine by paper chromatography. The related ribosome-dependent GTPase reaction was also investigated. If ammonium ions were present, the order of activities was Mg(II), Mn(II), Ca(II). In the absence of ammonium ions, this order was reversed. The requirements of both polymerization and GTPase reactions were studied in solutions containing magnesium and calcium ions. Considerable polymerization was found in solution containing calcium ions in the absence of added ribosome-dependent GTPase. The requirements of the polymerization reaction were investigated in greater detail by chromatography of the products. Significant synthesis of smaller peptides in the absence of added ribosome-dependent GTPase was then detected in solutions containing magnesium ions. The effects of removal removal of residual magnesium ions from the calcium ion system by previous dialysis of the ribosomes against a calcium ion solution were studied. These ribosomes were still active, but small amounts of magnesium ion were stimulatory. The ribosomes were inactive after dialysis in the absence of divalent ions. (Authors' abstract modified)

4092 APTIC NUMBER 13342

Grant, J. and S. V. Sergeant
PULP AND PAPER. Rep. Prog. Appl. Chem., vol. 51:525-539, 1966. 72 refs.

This is a selective review of the literature on developments in relatively new fields of the pulp and paper manufacturing industry. It covers approximately the two years ending November 1, 1966. The papers included for review emphasize the following aspects of pulp and paper manufacture: recent new principles and methods involved in pulp manufacture; advances in knowledge connected with the formation of paper on the paper machine; and new developments in the aftertreatment of paper for special purposes. The hot grinding of mixed hardwoods as a means of homogenizing pulp, delignification with drychlorine, and the treatment of groundwood pulps with peracetic acid exemplify developments in pulp production. Studies on the formation of paper by the paper machine include the use of synthetic fibers, alone or together with cellulosic materials; the interactions between water and cellulose materials; the effects of tension drying on the mechanical properties and structure of individual holocellulose pulp fibers; and the treatment of pulp by high consistency refining. Among the aftertreatments of paper are the use of silver-sensitized coatings, bladecoating machines, and polymers for hot melt coatings.

4093 APTIC NUMBER 13504

Gregg, S. John
THE HEAT OF ADSORPTION OF ETHYL CHLORIDE AND OF SULPHUR DIOXIDE ON SUGAR CHARCOAL. J. Chem. Soc., Part 2, , p. 351-355, 1943.

The heats of adsorption were measured by a Bunsen ice calorimeter, and the adsorption isotherms determined, from very low pressures up to atmospheric for sulfur dioxide and up to the saturated vapor pressure for ethylchloride by a volumetric method. The chief feature of the results was a sharp fall in the differential heat of adsorption of ethylchloride, from about 11,500 cal/mole to near the latent heat of condensation 6000 cal/mole, occurring within a narrow adsorption range and at pressures less than one-quarter of the saturated vapor pressure. The effect is ascribed to the inception of a layer more than one molecule thick. Henry's law was not obeyed by either gas even at the lowest pressures studied, probably because the film was still not sufficiently dilute to behave as a perfect two-dimensional gas.

4094 APTIC NUMBER 13583

Gregg, Sidney J.
THE HEAT OF ADSORPTION OF GASES BY CHARCOAL. Chem. Sci. J., Part 2, p. 1494-1512, 1927.

Measurements of the heat of adsorption, the equilibrium pressure, and the amount of gas adsorbed for eight gases on a standard charcoal at 0 C with the aid of a Bunsen ice calorimeter are described. A few experiments were also carried out at 40.35 C using a phenol calorimeter, and in some cases the charcoal was replaced with other standard samples. The integral heat of adsorption varied directly with the amount of gas adsorbed to a constant power and decreased with previous adsorption and subsequent elimination of the same or another gas. The constant is roughly characteristic of the gas and varies between 0.9 and 1.0. The Williams-Henry equation, log x/p equals A - Bx, where x is the amount of gas adsorbed, p is the equilibrium pressure, and A and B are constants at constant temperature, is satisfactory for all but the readily condensable gases.

4095 APTIC NUMBER 13279

Gross, Elizabeth L. and Lester Packer
ION TRANSPORT AND CONFORMATIONAL CHANGES IN SPINACH CHLOROPLAST GRANA. II. LIGHT-INDUCED CHANGES. Arch. Biochem. Biophys., 122(1):237-245, Oct. 1967. 29 refs.

It has been established that many of the responses of chloroplasts to illumination are also observed in isolated grana. Grana manifest light-dependent H(=) uptake, indicating that they are the origin of this activity observed in chloroplasts. It has also been established that grana undergo light-induced shrinkage. This was determined by packed volume, light-scattering, and ultrastructural studies. Two mechanisms for light-induced shrinkage are described. In one, both the rate and extent of shrinkage are increased upon addition of salts of weak acids. This mechanism appears to occur osmotically as a result of extrusion of weak acids from grana driven by light-induced H(=) ion uptake. In an alternative mechanism, shrinkage increases in the presence of salts of certain divalent cations. This shrinkage was not reversed in the dark, and appears to involve a light-dependent nonosmotic uptake of divalent cations. (Author abstract modified)

4096 APTIC NUMBER 13539

Grover, S. S.
APPLICATION OF COMPUTERS IN CHEMICAL REACTION SYSTEMS. Catalysis Reviews, 1(1):153-168, 1967. 14 refs.

The mathematical formulation of a generalized chemical reaction system is described where the totality of the reactions and the number of components in them are large. An example of the industrial production of styrene by catalytic dehydrogenation of ethylbenzene is taken to illustrate the formulation and logical computational scheme one would follow to solve such a system on a computer. For the purpose of illustration, it is assumed that the rates of the reactions as reported are sufficient, since the objective is not the reaction mechanism determination.

4097 APTIC NUMBER 13908

Grubner, Otto, Milos Ralek, and Pavel Jiru
PREPARATION AND PROPERTIES OF MOLECULAR SIEVES OF THE A TYPE. (Priprava a vlastnosti molekulovych sit typu A). Text in Czech. Chem. Prumysl, vol. 11:521-523, 1961. 16 refs.

Results obtained from investigations on the preparation of molecular sieves of 3.8 A, 4 A, and 5 A types and on the methods for evaluation of their properties are reviewed. Solutions of aluminum oxide, silicon dioxide, and sodium oxide are mixed in proper proportion. The resulting gel crystallizes after heating for several hours. The basic solvent is withdrawn by suction and the sieve is dried. Practical output from this method is 80-85% of theoretical expectation. X-Ray data for sieve structure were obtained by the Debye-Schuerrer method. Use of this synthesis technique results in a molecular sieve of quality equal to the sieves presently being imported. The sieves can be used for drying gases, in production of semiconductors, to maintain low humidity in plants, in the production of explosives, and is other industrial applications. The drying process can take place at high temperatures (100 C), and the water content can be lowered to 1-5 ppm. Molecular sieves can also be used for selective separation of gaseous components in gas purification for gas chromatography.

4098 APTIC NUMBER 13927

Gurevich, I. G. and V. S. Pagotzky
POROUS ELECTRODES WITH LIQUID REACTANTS UNDER STEADY-STATE OPERATING CONDITIONS. Electrochim. Acta, 9(9):1151-1176, 1964. 35 refs.

Steady-state operating conditions for porous electrodes with liquid reactants are considered, accounting for ohmic losses, activation, and concentration polarization. For diffusion supply of reactants, the general solution in a closed form is obtained for the problem of distribution of the electrochemical process in a porous electrode with finite thickness. Obtained in an explicit form and discussed are particular solutions of the same problem for the regions of high and low polarizations. For forced supply of reactants, two cases are considered: front and rear supply. For both cases the solution in an explicit form is obtained for low polarizations. A method for numerical solution is developed which is valid for the whole range of polarizations, and permits development and discussion of data for the rear reactant supply. Based on the solutions obtained, expressions for the efficiency of a porous electrode are presented. (Author abstract modified)

4099 APTIC NUMBER 13629

Haese, O.
PRESENT-DAY MEASURING TECHNIQUE AND RECENT RESULTS OF INTERNATIONAL FLAME RESEARCH. (Heutige Messtechnik und neuere Ergebnisse der Internationalen Flammenforschung.) Text in German. Zement-Kalk-Gips (Wiesbaden), (6):257-266, 1967. 8 refs.

The goal of the International Flame Research Institute in Ijmuiden is to predict and control flame properties. For this purpose, a number of measuring instruments have been developed; pitot tubes of standard or modified design (with fireproof ceramic probe, stainless steel probe, or a hemispherical probe with five holes); manometers which record the results (the one most frequently used is the Beaudouin-micrometer) with which differential pressures of less than 0.01 mm water can be measured); gas sampling thermocouples of various kinds (there is a pneumatically sampling thermocouple which can be used for temperatures of more than 1700 C, and for gases with high dust load, and for combustion chambers with high radiation intensity); and finally pyrometers for radiation measurements. An example for computation of the heat flux from the measured temperatures is given. Studies of spray-type oil burners showed that the flame can be stabilized by imparting a swirl movement to the primary air as well as by using a conically-widening burner nozzle. Experiments with pulverized coal of various kinds showed that fine-grained coal ignites faster than coarse coal. Moreover, it develops considerably stronger radiation intensity. The experiments also showed that variation of the amount of primary air used for combustion decreases or increases the temperature along the burner axis. More primary air means more ballast for the flame. Studies of the effect of swirl imparted on the primary air showed that combustion of anthracite (grain size less than 75 micrometers) with 55% of the primary air injected tangentially yielded the highest temperatures.

4100 APTIC NUMBER 13234

Hamilton, Terrell H., Ching-Sung Teng, and Anthony R. Means
EARLY ESTROGEN ACTION: NUCLEAR SYNTHESIS AND ACCUMULATION OF PROTEIN CORRELATED WITH ENHANCEMENT OF TWO DNA-DEPENDENT RNA POLYMERASE ACTIVITIES. Proc. Natl. Acad. Sci. U. S., vol. 59:1265-1272, 1968. 33 refs.

The sequential effects of estrogen on nuclear metabolism of RNA and protein in the uterus of the ovariectomized rat are discussed. After estrogen stimulation, a slight and delayed increase in the nuclear content of RNA and protein indicated an amplification of the protein-synthesizing machinery of the nucleus. This is necessary for underwriting the accelerated synthesis and transporting to the cytoplasm of ribosomes and ribosomal components. The process of nuclear synthesis and transport to the cytoplasm of ribosomes was found to be relatively rapid, and after the initial stimulation of nuclear RNA synthesis, the rate of this process seemed to be inversely correlated with the concentration of the particles in the cytoplasm. (Author conclusions modified)

4101 APTIC NUMBER 13209

Hanig, Ruth C. and M. H. Aprison
DETERMINATION OF CALCIUM, COPPER, IRON, MAGNESIUM, MANGANESE,

POTASSIUM, SODIUM, ZINC, AND CHLORIDE CONCENTRATIONS IN SEVERAL BRAIN AREAS. Anal. Biochem., 21(2):169-177, Nov. 1967. 29 refs.

A method is described for determining concentrations of potassium, sodium, magnesium, calcium, iron, zinc, copper, manganese, and chloride in single brain areas. Three methods of ashing were used in preparation of the samples (rabbit brains): dry-ashing in platinum crucibles, wet-ashing in 0.75 N nitric acid, and wet-ashing in concentrated nitric acid. The best overall ashing method for recovery of all eight cations, but not Cl, was dry-ashing in platinum crucibles. Chlorine was recovered using the dilution HNO3 ashing procedure. The methods of atomic absorption spectrophotometry and chloride titration were employed in the ion assays. Results showed that K was present in highest concentrations in all five areas of the brain, followed in decreasing order by Na, Cl, Mg, Ca, Fe, Zn, Cu, and Mn. The Cu and Mn concentrations were highest in the paleothalamic nuclei. Copper concentrations in the paleothalamic and the caudate nuclei were also higher than in the cerebral cortex. Magnesium and Ca showed the least variation among the five brain areas, whereas the Na, Cl, Fe, Zn, and Mn concentrations were higher in the cortex and caudate nuclei than in the cerebellum and medulla.

4102 APTIC NUMBER 13900

Harding, John Windsor
KINETICS OF CATALYTIC DECOMPOSITION OF NITRIC OXIDE. Illinois Univ., Urbana, Ph.D. Thesis, Ann Arbor, Mich., Univ. Microfilms, Inc., 1969, 76p. 25 refs.

This thesis presents the results, correlation, and interpretation of an experimental study of the rate of decomposition of nitric oxide on an aluminum oxide catalyst. The constants of the correlations are interpreted in terms of Langmuir-Hinshelwood mechanisms. Experiments were conducted in a different fixed-bed reactor. The reactor was operated at 644 to 807 C with space velocities of 168 to 2280/hr at standard temperature and pressure. Input to the reactor was 10 to 15 mole % nitric oxide diluted with nitrogen or helium. The 0.2 to 2.0% resulting conversion was measured with a photoelectric colorimeter. The rate of decomposition of nitric oxide was correlated as a function of nitric oxide concentration for all results. The mechanism supported by calculations is the reaction of two adjacently adsorbed nitric oxide molecules as the slow step with nitric oxide and nitrogen in equilibrium between gas and adsorbed phases. In this interpretation, nitric oxide is much more strongly adsorbed than nitrogen. After prolonged heating at approximately 740 C, the activated catalyst loses activity, following which the interrelations of the activation energies apparently change, although the form of the rate equation is unaltered. (Author summary modified)

4103 APTIC NUMBER 13257

Harris, N. D. and J. P. Richards
EFFECT OF METALLIC CATIONS ON THE VIABILITY OF PHENOL-TREATED ESCHERICHIA COLI. Appl. Microbiol., 16(2):239-241, Feb. 1968. 9 refs.

Five metallic cations (Fe(3+), Cr(3+), Ca(2+), Mg(2+), Mn(2+) in the concentration range of .000185 to .00037M were incorporated individually as chlorides into nutrient broth and agar media used for the recovery of phenol-treated Escherichia coli. The effects observed varied with the concentration and the ionic species. In nutrient agar, Fe(3+) and Cr(3+) were generally beneficial but were toxic at .0037M. Of the divalent ions tested, Ca(2+) and Mg(2+) usually gave higher counts in nutrient broth, except at a concentration of .000925M, whereas the effect of Mn(2+) was rather variable. Two possible explanations are suggested to explain these effects. Toxic materials may be removed from the media by the precipitates formed on the addition of Fe(3+) or Cr(3+), or, in the case of the divalent ions, the integrity of the bacterial cell membranes may be maintained. (Author abstract modified)

4104 APTIC NUMBER 13382

Hartler, Nils
THE EFFECT OF CHIP DAMAGE ON THE FIBRE BONDING OF ACID BISULPHITE PAPER PULPS. Svensk Papperstid, 66(10):412-417, 1963. 30 refs.

The effect of chip damage on fibre bonding was investigated by comparing pulps in one case from damaged and undamaged halves of technical chips and in another from pressed and unpressed wood. It was found that neither the specific energy of bond failure according to Nordman nor the bonded area, as measured by the optical contact methods, are affected as far as acid bisulfite paper pulp fibres are concerned. The implication of the findings for the strength of the resultant paper is discussed. (Author abstract modified)

4105 APTIC NUMBER 13457

Hartree, E. F.
A COMPARISON OF HORSERADISH PEROXIDASE AND MANGANESE IONS AS CATALYSTS FOR THE OXIDATION OF DIHYDROXYFUMARIC ACID. Biochem. J., Vol. 107:581-587, 1968. (25) refs.

With horseradish peroxidase as catalyst the main product was dihydroxytartrate, but small amounts of glycolaldehyde, mesoxalic semialdehyde, mesoxalate and possibly glycxal were also formed. Catalysis by Mn(2I) gave rise only to mesoxalate and oxalate. When oxygen uptake was followed by a manometric method, the rate of the peroxidase-catalyzed reaction was proportional to oxygen concentration and marked inhibition by cyanide was obtained only at low buffer concentration. The catalytic effects of peroxidase and Mn(2I) were almost always additive. Chelating agengt inhibited the Mn(2I)-catalyzed reaction, but had either no effect or a slight accelerating effect on the peroxidase-catalyzed reaction. It is concluded that Mn(2I) does not function as confactor in the peroxidase-catalyzed oxidation. (Author abstract modified)

4106 APTIC NUMBER 13709

Haul, R. A. W.
STUDIES OF ADSORPTION ON THERMALLY DECOMPOSED DOLOMITE CRYSTALS. (Adsorptionsuntersuchungen an thermischezersetzten Dolomitkristallen). Text in German. Z. Anorg. Allgem. Chem., vol. 281:199-211, 1955. 24 refs.

Specific surfaces and pore distributions were determined from adsorption isotherms of argon on dolomite crystals thermally decomposed under various conditions. The results showed that specific surface, pore volume, and crystalline size, as well as linear shrinking of heated dolomite crystals, experience a sudden change in the temperature range from 800 to 1000 C. The specific surface is quite large at temperatures between 700 and 800 C, approximately 55 sq m/g. Above 800 C it decreases suddenly, and at 1100 C, it is reduced to 0.5 sq m/g. With slower decomposition rates, the decomposition products possess a considerably larger specific surface. The decrease in the surface at increasing decomposition temperature is accompanied by a decline in the pore volume, whose magnitude was larger than theoretically expected. This permits the conclusion that a considerable fraction (about 35%) of the pore volume is inaccessible to capillary condensation, due to cavities which are surrounded on all sides by crystals and which thus have no connection with each other. Above 1100 C, no pore volume suitable for capillary condensation exists. Maximum pore sizes were found between 700 and 800 C. The experiments further showed that small dolomite crystals can be thermally decomposed without dissociation into smaller entities. Larger crystals of about 5 mm dissociated, however. At 1200 C, a shrinkage of 20% was found, while at 700 C, no measurable changes in the dimensions occurred.

4107 APTIC NUMBER 13208

Haven, E. C., G. T. Haven, and A. L. Dunn
SIMULTANEOUS DETERMINATION OF CALCIUM, COPPER, MANGANESE, AND MAGNESIUM IN SERUM BY NEUTRON ACTIVATION. Anal. Chem., 38(1):141-143, Jan. 1966. 4 refs.

In the neutron activation of blood serum, a mixed solvent system of thenoyltrifluoroacetone in benzene-tetrahydrofuran was used to separate the desired elements. Neutron activation, isolation of the elements, and gamma ray spectrometry followed. The proteins of aliquots of a pooled serum sample were precipitated and the Ca, Mn, Mg, and Cu content of the supernatant was determined. The standard deviation of the method of various aliquots of serum was about 10% for Ca, Cu, and Mg, with Mn being about 16%. Results of the analyses of these elements and the results obtained in recovery tests are presented in tabulated form. These values are not meant to be normal values, but rather show the feasibility and reproducibility of this method in actual biological samples. The simplicity of a simultaneous determination as opposed to single element analysis renders this method practical and convenient by comparison. Accuracy and precision are equivalent to, and in most cases surpass, the best methods available for single element activation analysis of serum.

4108 APTIC NUMBER 13324

Hayakawa, Taro, Masahiro Hirashima, Minoru Hamada, and Masahiko Koike
EFFECT OF VARIOUS BIVALENT CATIONS AND CHELATING AGENTS ON THE OXIDATIVE DECARBOXYLATION OF ALPHA-KETO ACIDS. Biochim. Biophys. Acta, 123(3):574-576, Dec. 1966. 8 refs.

The effects of several bivalent cations and ethylenediaminetetraacetic acid (EDTA) on the oxidative decarboxylation of alpha-keto acids in pig heart pyruvate dehydrogenase and 2-oxoglutarate dehydrogenase complexes and Escherichia coli pyruvate dehydrogenase and 2-oxoglutarate complexes are reported. Special attention is given to the activating effect of Ca(2 plus) and Mg(2 plus) cations, as well as the inhibitory effect of EDTA. Tabulated data show that all complexes, except E. coli pyruvate dehydrogenase, were strongly stimulated by Ca(2 plus); Mg(2 plus) had a similar effect, while EDTA inhibited the pig heart pyruvate dehydrogenase complex and both E. coli complexes, but not the pig heart 2-oxoglutarate complex. Indications that firmly bound metal ions play a role in the oxidative decarboxylation of alpha-keto acids were verified by spectrophotometric determination of the protein-bound metals in both pig heart complexes. Highly purified pyruvate dehydrogenase complex contained 0.98 millimicromoles of Mg(2 plus) and 1.6 millimicromoles of Ca(2 plus) per mg of protein, and the 2-oxoglutarate dehydrogenase complex contained 1.7 micromoles of both Mg(2 plus) and Ca(2 plus) per mg of protein.

4109 APTIC NUMBER 12259

A. Hayhurst, and T. Sugden
IONIZATION PROCESSES, CONNECTED WITH ADDITION OF METALS TO GAS FLAMES. In: Low-Temperature Plasma (Selected Articles). Translated from Russian. Foreign Technology Div., Wright-Patterson AFB, Ohio, p. 9-29, June 21, 1968. 17 refs.

An experimental study of the ionization processes in hot products of combustion process (flame gases) as weak plasma media is presented. Among the topics discussed are the physical and chemical properties of flames, mass spectroscopic observations, electron concentration measurements and thermal and chemical ionization. The experimental techniques, which effectively combine electron concentration measurements with direct mass spectroscopy, are described. Direct collisional ionization of metallic elements, hydrated positive ion formation, and mutual ionization be electron exchange are the phenomena observed in the weak plasmas of flame gases.**

4110 APTIC NUMBER 13328

Heller, Manna and M. G. Kulka
RIBONUCLEASE ACTIVITIES OF THE DEVELOPING CHICK PANCREAS. Biochim. Biophys. Acta, 167(1):110-121, Aug. 1968. 22 refs.

The separation of Mg(2 plus)-ribonuclease and neutral ribonuclease on the basis of their different solubilities shows

that there are at least two different ribonucleases in embryonic chick pancreas. Mg(2 plus)-Ribonuclease activity is probably due to a soluble magnesium-requiring endonuclease. Neutral ribonuclease activity, which is bound to particles, does not require metal ions. It hydrolyzes RNA core and polyuridylic and polycytidylic acids but not polyadenylic or polyinosinic acids. Experiments show that Mg(2 plus)-ribonuclease is a digestive enzyme. On treatment in vitro with carbamylcholine, chick pancreas secretes Mg(2 plus)-ribonuclease as effectively as it secretes amylase. The role of the neutral ribonuclease is a mystery. Its insolubility as well as the decrease in its specific activity during development indicate that it is not a digestive enzyme. Differential centrifugation studies on homogenates of pancreas in isotonic sucrose show that the Mg(2 plus)-ribonuclease, like other digestive enzymes, is located mainly in the zymogen granule and soluble fractions, while a large portion of the neutral ribonuclease is associated with heavy particles. The specific activity of neutral ribonuclease reaches a peak between 16 and 18 days of development, just before the maturation phase of the pancreas, while Mg(2 plus)-ribonuclease's specific activity increases steeply from 18 to 22 days. It is suggested that digestive enzyme activities in chick pancreas increase in a nonparallel manner before 17 days of development and afterwards in a parallel manner. (Author summary modified)

4111 APTIC NUMBER 13928

Herz, W.
CONTRIBUTION TO THE KNOWLEDGE OF THE CONVENTIONAL CHEMICAL CONSTANTS. (Zur Kenntnis der Konventionellen chemischen Konstanten). Text in German. Z. Angew. Chem., vol. 37:453-454, 1924. 6 refs.

This note points out that the expression, C equals 1.7 log (gamma-s/0.427), obtained by substitution of the author's expression for the critical pressure of a substance, P(k) equals gamma-s/0.427, where gamma-s is the surface tension coefficient at its boiling point, into Cederberg's expression for its 'conventional' chemical constant, C equals 1.7 log/P(k), yields values for H2, O2, N2, H2O, SO2, CS2, NH3, CHCl3, CCl4, and C6H6 in fair agreement with those computed with Nernst's formula, C equals 0.1q(ML/Ts), where M is the molecular weight, L is the heat of evaporation, and Ts is the absolute temperature of the boiling point. Moreover, substitution of the author's expressions for L equals Ts/0.44 x Z x d(k) and M equals 9.24 x Z x d(k), for a class of organic compounds, where Z is the valence number and d(k) is the critical density, into Nernst's formula yields the value C equals 2.96, which is close to the values obtained using Cederberg's expression for these compounds.

4112 APTIC NUMBER 13541

Himmelblau, D. M., C. R. Jones, and K. B. Bischoff
DETERMINATION OF RATE CONSTANTS FOR COMPLEX KINETICS MODELS. Ind. Eng. Chem. Fundamentals, 6(4):539-543, Nov. 1967. (31) refs.

A method of determining kinetic rate coefficients for complex reactions by user-oriented iterative methods is described. The differential equations representing the reaction system may be nonlinear in the dependent variable, but must be linear in the coefficients. Direct integration of the model for a sequence of time steps permits the model coefficients to be estimated by maximizing the multivariate correlation coefficient, which is the same as minimizing the sum of the squares of the weighted deviations. Three weighting schemes are compared. It is concluded that this method of calculating rate parameters can be used for nonlinear systems and fairly complex systems with reasonable accuracy. Its main weakness is the sensitivity of the desired parameters to errors in the initial integrals. This can be compensated for in experimentation by obtaining a greater number of data points during the rapidly changing stage of the concentration-time curve.

4113 APTIC NUMBER 13271

Himmelhoch, S. Ralph, Herbert A. Sober, Bert L. Vallee, Elbert A Peterson, and Keiichiro Fuwa
SPECTROGRAPHIC AND CHROMATOGRAPHIC RESOLUTION OF METALLOPROTEINS IN HUMAN SERUM. Biochemistry, 5(8):2523-2530, Aug. 1966. 20 refs.

Fractions of dialyzed human serum obtained by gradient chromatography on DEAE-cellulose columns were analyzed for metals by spark emission and atomic absorption spectroscopy. Such measurements required the prior development of a noninterfering eluting buffer and elimination of contaminating metals from the chromatographic system. Iron, zinc, manganese, and nickel were found reproducibly in specific fractions, presumably as constituents of metalloproteins. Calcium, magnesium, and strontium were also localized, but their association with proteins seems more tenuous, since they are more loosely bound. Zinc is found in three distinct fractions from one of which a protein containing a stoichiometrically significant amount of zinc was partially purified. All three zinc fractions were separated from the activities of serum enzymes previously known to contain zinc. (Author abstract)

4114 APTIC NUMBER 13017

Holland, Robert A.B.
RATE OF O2 DISSOCIATION FROM O2HB AND RELATIVE COMBINATION RATE OF CO AND O2 IN MAMMALS AT 37 C. Resp. Physiol., 7(1):30-42, June 1969. 25 refs.

The rate at which CO displaced oxygen from combination with oxyhemoglobi olution has been measured at different oxygen tensions at 37 C. The hemoglobins studied were human adult and fetal, horse, goat, dog, cat and rabbit. From these results there were determined the velocity constant for the dissociation of oxygen from fully saturated hemoglobin (k4) the velocity constant for replacement of oxygen from fully saturated hemoglobin at low tensions of CO, and the ratio of the velocity constants for the combination of CO and O2 with three-parts saturated hemoglobin.

The values found are reported. The velocity of the displacement reaction varied among rabbits despite their having electrophoretically similar hemoglobins, and was slower than in the other species. The value of k4 for dog Hb, human Hb F, and cat Hb was significantly higher than for the hemoglobins of the human adult, horse, goat and rabbit. Goat hemoglobins A and B, whose alpha chains differ, showed the same rate for the replacement reaction.

4115 APTIC NUMBER 13576

Holmes, J. M. and R. A. Beebe
ADSORPTION STUDIES ON A SERIES OF HEAT TREATED SHAWINIGAN ACETYLENE CARBON BLACKS. Can. J. Chem., 35(12):1542-1550, 1957. 30 refs.

An experimental study has been made of the adsorption of nitrogen, sulfur dioxide, carbon dioxide, and ammonia on Shawinigan acetylene carbon black and several derivatives of this material produced by heat treatment up to temperatures of 3000 deg. The effect of the heat treatment of the Shawinigan carbon black on its adsorption of the polar and non-polar gases studied is compared with the behavior of other heat treated carbon blacks. The effect of the low oxygen content of the Shawinigan black is considered. The isosteric heats of adsorption for ammonia on the most highly graphitized material (Shawinigan 3000) have been calculated. The results are in general agreement with previous calorimetric work. A special type of hysteresis for the system ammonia - Shawinigan black has been observed. This may be due to a reversible swelling of the graphitic material.

4116 APTIC NUMBER 13849

Hougen, O. A. and K. M. Watson
SOLID CATALYSTS AND REACTION RATES. Ind. Eng. Chem., vol. 35:529-541, May 1943, 9 refs.

A liquid or gas phase chemical reaction catalyzed by a solid is presumed to occur on the surface of the catalyst and to involve the reaction of molecules or atoms adsorbed by activation on the active centers of the surface. The catalyst, through its ability to adsorb the reactants in a manner involving reduced activation energies, increases the rate of reaction. From these principles general rate equations were developed for evaluating the effects of operating variables of catalytic systems and arriving at optimum reactor designs. When applied to the interpretation and extension of rate data, they should reduce pilot plant experimentation. Consideration is given to the differences in equation forms resulting from control of the rate by different types of activated steps. Quantitative expressions are proposed for four types of activities: (1) the mass transfer of reactants and products to and from the exterior surface of the catalysts particle and the main body of the fluid, (2) the diffusional and flow transfer of reactants and products in and out of the pore structure of the catalyst particle when reaction takes place at interior interfaces, (3) the activated adsorption of reactants and activated desorption of products at the catalytic interface, and (4) the surface reaction of the adsorbed reactants to form activation-adsorbed products.

4117 APTIC NUMBER 13604

Hrutfiord, Bjorn F.
LIGNIN DEGRADATION PRODUCT ANALYSIS BY GAS CHROMATOGRAPHY. TAPPI, 48(1):48-54, Jan. 1965. 16 refs.

The use of gas chromatography as an analytical tool in lignin chemistry is reviewed. Lignin degradation products are classified, and general requirements for successful gas chromatography analysis of these compounds are discussed. High capacity capillary columns coated with polar and nonpolar liquid phases were used to successfully analyze phenolic compounds from several different types of degradation reactions. Polyester coatings such as diethylene glycol succinate gave excellent resolution of the phenolic compounds resulting from alkaline hydrolysis of a nitrobenzene oxidation of wood meal and lignins. Less polar liquid phases such as polyphenyl ether or apiezon L grease gave more rapid but less informative analysis. Phenolic samples from kraft liquor, pressure demethylation, and hydrogenation of lignins were also analyzed. The results presented in chromatograms indicate that gas chromatography has wide application in lignin chemistry. (Author abstract modified)

4118 APTIC NUMBER 13577

Hyatt, Edmond Preston
THERMOGRAVIMETRIC STUDY OF CALCIUM CARBONATE DECOMPOSITION. Thesis (Ph.D.), Utah Univ., Salt Lake City, Dept. of Ceramics, 77p., Aug. 1956. 5 refs.

A readily assembled apparatus includes a chain-weight balance with an optical lever adapted so that the light beam registers on either of two photocells depending upon the direction of unbalance. Current from the photocells is amplified and used to drive a small reversing motor which adds or subtracts chain on the balance as required. A sample of thermally reactive material is suspended from one pan of the balance into an electrically heated tube furnace. The magnitude of weight loss or gain occurring in the sample during the reaction is recorded instantaneously by an electronic recorder. This apparatus was used to study the decomposition of calcium carbonate crystals under controlled temperature and atmospheric conditions. An expression for the rate of decomposition was derived from experimental and kinetic data. Decomposition of $CaCO_3$ is a two-stage reaction. Initially CO_2 leaves the $CaCO_3$ cell and the residue of CaO apparently assumes a metastable rhombohedral configuration similar to the original $CaCO_3$. The second step is the formation of well-crystallized CaO from the active CaO. Another set of experiments using the same apparatus shows the effect of water vapor on the

decomposition of CaCO3 both in the presence and absence of CO2. An equation for the rate of decomposition is given. The water vapor serves as a catalyst assisting in the removal of CO2 from CaCO3. The Eyring absolute rate theory is used to explain the significance of data. Enthalpies and entropies of activation are estimated. (Author abstract modified)

4119 APTIC NUMBER 13289

Iida, Chuzo and Keiichiro Fuwa
STUDIES WITH A MULTICHANNEL FLAME SPECTROMETER. II. THE SIMULTANEOUS DETERMINATION OF MAGNESIUM, CALCIUM, COPPER, MANGANESE, AND CHROMIUM. Anal. Biochem., 21(1):1-8, Oct. 1967. 9 refs.

The use of a multichannel flame spectrometer for the simultaneous determination of magnesium, calcium, copper, manganese, and chromium is described. Known amounts of certified National Bureau of Standards samples were dissolved in 1 N HCl, with each element measured eleven times. The mean, standard deviation, and coefficient of variation were determined from these measurements. Accuracy was calculated from a comparison of the experimental value and the expected value calculated from the dilution of each original certified sample. Results show that the spectrometer yields precise, accurate, and reproducible data. The effect of cations and anions on the measurements was determined by obtaining standard working curves for each element in both single and multicomponent solution. When all the elements are present simultaneously, a small but significant decrease in emissivities is observed only for calcium and chromium. By making 1 N HCl the standard solvent for the system, it is possible to measure magnesium, manganese, and copper simultaneously even when calcium and chromium are present in equal concentrations. The mutual interference of calcium and chromium cations effects a decrease in sensitivity over the entire concentration range by shifting the whole working curve without significant change in the slope. Accurate determination of calcium and chromium by the present method can be obtained by calibrating the system with known concentrations of the interfering cations. Phosphate was the only anion found to interfere with the emissivity of each element. Its elimination is a major objective of further extension of the current work.

4120 APTIC NUMBER 13611

Iravani, J. and W. Weller
CILIARY ACTIVITY IN THE INTRAPULMONARY PASSAGES OF THE RAT AFTER LONG TERM EXPOSURE TO DUST. (Flimmertatigkeit in den intrapulmonale Luftwegen der Ratte nach Langzeitbestaubung.) Text in German. Beitr. zur Silikose-Forsch. (Bochum), Vol. 96, p. 43-52, 1968. 20 refs.

Examination of ciliary activity was performed on 25 male Wistar rats weighing 400-600 grams. Over 18 months eight rats were exposed to coal/quartz dust containing 60% coal and 40% quartz, and six rats to the coal/quartz with an addition of 0.5% Al(OH)2Cl; 11 rats served as a control group. The results of examining the groups 4-6 months after the experiment were similar. The interstitium and the alveolar membrane were tough, thickened, and hardened. The pleura was thickened and removable. No quantitative or qualitative variations in ciliary activity in the lung passages were observed. However, there were patches in the mucosa of the lung passage with no ciliary activity. Numerous encapsulated yellow particles also appeared in the lung tissue.

4121 APTIC NUMBER 13231

Jacob, S. T., F. M. Sajdel, and H. N. Munro
PRESENCE OF TWO RNA POLYMERASE ACTIVITIES IN LIVER NUCLEOLI. Biochim. Biophys. Acta, 157(2):421-423, April 1968. 17 refs.

Mammalian cells exhibit two types of RNA polymerase activity, one of which requires the presence of Mg(2+) and the other Mn(2+). It has been demonstrated that nucleoli isolated from liver cells contain both types of polymerase. Nuclei were isolated from the livers of male rats and nucleoli were then prepared by sonication. The isolated nucleoli were assayed for RNA polymerase activity either in the presence of Mg(2+) or Mn(2+) with (NH4)2SO4, using standard conditions of incubation. The Mg(2+)-dependent activity was little affected by low or high concentrations of salt. The Mn(2+)-dependent activity was maximally stimulated by 0.4M (NH4)2SO4. At 0.04M (NH4)2SO4, which was the level used in most autoradiographic studies, the polymerase activity of the nucleoli was not increased above the level obtained with Mn(2+) alone. Failure to detect Mn(2+)-dependent activity in nucleoli by autoradiographic studies on whole nuclei can be attributed to the use of salt concentrations low enough to prevent rupture of the nuclear membrane, but also below the level of stimulation of nucleolar polymerase activity. These data do not support a sharp distinction in the location of the two types of polymerase activity within the nucleus, since both can be demonstrated within the nucleolus.

4122 APTIC NUMBER 13889

Jaffe, Sigmund and Fritz S. Klein
PHOTOLYSIS OF NO2 IN THE PRESENCE OF SO2 AT 3660 A. Trans. Faraday Soc., 62(521):2150-2157, May 1966. 16 refs.

Nitrogen dioxide was irradiated at 3660 A in the presence of SO2. Quantum yields were measured as a function of SO2 pressure, and the specific rate constant for O plus SO2 yields SO3 was determined. The ratio of rate constants for the proposed reactions: SO3 yields O plus SO2 and SO3 M yields SO3 plus M, was estimated to be 0.077 mole/l by the combination of the results of quantum yields with those of isotopic oxygen scrambling. A simple, bimolecular dark reaction was also observed.

4123 APTIC NUMBER 13253

Jansen, Lena and Olof Samuelson
OXIDATION OF LIGNIN BY POLYSULFIDE SOLUTIONS. Svensk Papperstid., 70(19):607-609, Oct. 15, 1967. 5 refs.

Alkali lignin was subjected to polysulfide cooking and the changes in the concentrations of polysulfide, thiosulfate, and sulfide were determined after various times of reaction. From these changes it can be concluded that dissolved alkali lignin was oxidized by polysulfide during an early stage of the cooking. Sulfide formed in this reaction was partly consumed in reactions with the lignin. Only a minor part of the polysulfide sulfur was under the applied working conditions, decomposed by disproportionation into thiosulfate and sulfide. (Author abstract)

4124 APTIC NUMBER 13350

Jensen, W., B. C. Fogelberg, K. Forss, K-E. Fremer, Monica Johanson
SULFUR DISTRIBUTION IN AN ACID CALCIUM BISULFITE COOK. Tappi, 48(3):174-180, March 1965. 20 refs. (Presented at the First International Sulphite Pulping Conference sponsored jointly by the Tech. Assoc. of the Pulp and Paper Industry and Tech. Sect., CPPA, Chicago, June 16-18, 1964).

The reactions of the bisulfite ions in an acid calcium bisulfite cook were studied by labeling the cooking acid with Na2S(35)03 and by gel filtration of the resulting radioactive spent liquor. The analyses revealed that three fourths of the sulfur in the cooking liquor reacted to form only compounds containing 'loosely bound' sulfur dioxide or did not react at all. Only about 13% of the sulfur reacted to form organic compounds containing firmly bound sulfur. It could be shown that of this sulfur about 66% was bound to the lignin whereas the rest was bound to about a dozen lignin-like compounds and nonaromatic compounds. It was found that there are equivalent amounts of calcium and sulfur in at least the low-molecular weight calcium lignosulfonates and it was also found that the sulfonation of lignin is accompanied by the formation of reducing groups. The large amounts of sulfur bound to wood components other than lignin show that bisulfite ions participate in many unknown side reactions in an acid bisulfite cook. (Author abstract modified)

4125 APTIC NUMBER 13270

Johan, H. E., J. V. Amin, and D. M. Taylor
NUTRITIONAL LIMITATIONS AND MEASUREMENTS OF MANGANESE AND MOLYBDENUM AVAILABILITY TO COTTON. Agr. Chem., 21(8):18-20, 72, Aug. 1966. 7 refs.

Manganese and molybdenum requirements of the cotton plant were measured, and the availability of the micronutrients in three major cotton producing areas was determined. Manganese was determined by a modification of the potassium periodate method and molybdenum by the Evans method. Molybdenum deficiency was produced in plants supplied with 0.0015 ppm Mo. Molybdenum concentrations in normal plants range from 3.0-898 ppm in leaves, 1.0-188 ppm in stems, 0.4-171 ppm in roots, and 1.0-72 ppm in seeds. Concentrations above or below these levels limited growth. Manganese deficiency occurred at 0.005 ppm Mn in solution. Normal plants contained Mn concentrations of 14-2000 ppm in leaves, 5-495 ppm in stems, 12-1000 ppm in roots, and 12-28 ppm in seeds. Concentrations above or below these levels limited growth. Manganese soil deficiency was found to exist in the Rio Grande Valley and Trans-Pecos areas of Texas. Spraying the plants with manganese gave positive results.

4126 APTIC NUMBER 13564

Johnston, Harold S. and Harvey J. Crosby
KINETICS OF THE FAST GAS PHASE REACTION BETWEEN OZONE AND NITRIC OXIDE. J. Chem. Phys., 22(4):689-692, April 1954. 7 refs.

The rate of reaction between ozone and nitric oxide was measured optically at -43 and -75 deg. A diagram of the apparatus was provided. The stoichiometry of the reaction was established with reactant concentration and temperatures (-45 deg to room temperature) higher than those used for rate studies. Under those conditions, the rate would have been too fast to follow. The reaction was a very fast second-order process, and the reactants and products were simple molecules of well-known kinetic properties. The mechanism was bimolecular: NO plus 03 yields NO2 plus 02. In view of the low activation energy for this reaction, it was compared to other similar bimolecular processes which have higher energies of activation. There appeared to be no systematic difference in pre-exponential factor between the fast and the slow reactions.

4127 APTIC NUMBER 13595

Johnstone, H. F., R. L. Pigford, and J. H. Chapin
HEAT TRANSFER TO CLOUDS OF FALLING PARTICLES. Trans. Am. Inst. Chem. Engrs., Vol. 37, p. 95-133, 1941. 24 refs.

The problem of the design of equipment for 'flash' heating of finely divided particles was studies theoretically and experimentally. A new solution was presented for the Fourier-Poisson equation for heat transfer to spheres submerged in moving fluid. The equation of radiation from hot furnace walls to a cloud of particles was given as a function of the concentration of the particles, the shape of the furnace, the absorptivity of the particles, and the temperature of the wall and the particles. The convection transfer from the furnace wall to the gas is shown to be considerably grater than that in natural convection. Measurements of the overall rate of heat transfer were made in two sizes of furnaces for several sizes of sand, Alcoxite and Carborundum particles falling through air and carbon dioxide. Wall temperatures from 575 to 1050 to 1050 F and feed rates from 3 to 40 lbs/min/sq ft were used. New data were obtained on rates of fall, projected areas, and average diameters of particles. Individual heat transfer coefficients were calculated from the experimental data. The results were applied to the design of a large-scale furnace for the flash calcination of hydrated zinc sulfite.

4128 APTIC NUMBER 13790

Kainz, Gerald and Gertrude Chromy
ON THE CHEMICAL DEACTIVATION OF OXIDE LAYERS. (Uber die chemische Desaktivierung von Oxidschichten). Text in German. Z. Anal. Chem., 218(2):104-112, 1966.

Chemical deactivation of several oxides employed for hydrocarbon and N analysis was investigated. A decrease in oxidizing efficiency is caused mainly by the formation of residues in the oxide layer, with an additional decrease due to the reducing hydrocarbon component of the sample. The amount of residues formed varies among oxides; Co_3O_4 is deactivated to a minor extent, but most interferences are observed with CuO. (Author summary modified)

4129 APTIC NUMBER 13267

Karp, I. N., P. S. Soroka, L. N. Dashevskiy, and S. D. Pis'mennaya
COMPUTER CALCULATION OF THERMODYNAMIC EQUILIBRIUM OF THE COMBUSTION PRODUCTS OF METAL-OXIDANT MIXTURES. (Raschety termodinamicheskogo ravnovesiya produktov goreniya metano-okislitel'nykh smesey na elektronno-vychislitel'nykh mashinakh). Text in Russian. Akad. Nauk SSSR, Teplofiz. Vysokikh Temp., 5(1):69-78, 1967. 15 refs.

Development of a system of equations for describing thermodynamics equilibrium for the combustion products of a metal-oxidant mixture, and suitable for machine computation, is examined. Results for calculations are presented for the following parameter ranges: temperature, 1600-4000 K; pressure, 1-3 bar; oxidant excess ratio, 0.4-2.0; degree of oxygen enrichment, from pure air to pure oxygen. This method may be used to determine optimum combustion conditions. This article is condensed from a report given at the All-Union Conference on the Thermophysical Properties of Substances, Odessa, September 1964.

4130 APTIC NUMBER 13359

Kealy, P. D. and T. W. Sullivan
STUDIES ON MANGANESE REQUIREMENT AND INTERACTIONS IN THE DIET OF YOUNG TURKEYS. Poultry Sci., 26(6):1352-1358, 1966. 12 refs.

Five experiments were conducted to study the manganese requirement and interactions in the diet of young turkeys. Data relative to body weight gain, incidence of hock disorders, percent survival, and feed efficiency indicate that the manganese requirement was influenced by diet composition. With a dextrose-isolated soybean protein diet, 24 and 54 ppm of manganese, respectively, were required for maximum body weight gain and minimum hock disorders. Maximum body weight gain and minimum hock disorders were obtained with only 12 and 22 ppm, respectively, in a dextrose-dried skim milk-casein diet. A practical-type, corn-soybean meal diet with no protein of animal origin was used in two experiments. Maximum body weight gain was obtained with 32 ppm of manganese in one experiment and 52 or 72 ppm in the other. No significant interaction between graded levels of manganese and graded levels of zinc feed occurred in a dextrose-isolated soybean protein diet. Supplemental zinc did not alter the manganese requirements; added manganese did not reduce or increase the zinc requirement. Symptoms of manganese and zinc deficiencies were different. An interaction between dietary manganese and sodium chloride relative to body weight was significant. Poults receiving the high levels of manganese combined with the lower levels of sodium chloride showed the greatest body weight gain. (Author summary modified)

4131 APTIC NUMBER 13186

Kenaga, D. L., W. A. Kindler, and F. J. Meyer
STUDIES OF ADSORPTION OF CATIONIC POLYELECTROLYTES ON PULP USING STREAMING CURRENT DETECTION. Tappi, 50(7):381-387, July 1967. 11 refs. (Presented at the 52nd Annual Meeting, Tech. Assoc. of the Pulp and Paper Industry, New York, Feb. 20-23, 1967).

A new instrument, the Streaming Current Detector (SCD), offers a technique to measure the capacity of a pulp to adsorb cationic materials such as those used to give wet strength. The SCD can also be used to determine the relative ionic strength of polyelectrolytes. In the case of cationic strength agents, the ionic strength of the polymer correlates with the strength increase observed in treated paper. Operating on the streaming current phenomenon, the SCD depends upon adsorption from the effluent to establish an ionic double layer on the operating surfaces of the instrument. The data indicate that the charge characteristics of the pulp-polyelectrolyte-water system can be related to the pulp-polyelectrolyte-water-SCD system. It is shown that adsorption of cationic strength agents on pulp occurs by a dual mechanism. Primary adsorption occurs to the point of charge neutrality and is thought to be an ion exchange mechanism. Secondary adsorption is thought to be due to van der Waals' forces or hydrogen bonding. The maximum quantity of a cationic polyelectrolyte adsorbed on pulp by the primary mechanism is pH-dependent: the more basic the solution the more adsorbed and, hence, the greater the strength of the treated paper. However, the increase in strength per unit of additive to the point of charge neutrality is similar at all pH levels and, therefore, is independent of pH. Secondary adsorption produces some increase in strength which appears to vary with additive and pH. Maximum efficiency of retention is observed at the point of charge neutrality. (Author abstract)

4132 APTIC NUMBER 13240

Kesler, Richard B.
ANALYSIS OF ALKALINE PULPING LIQUORS. IV. AUTOMATIC COLORIMETRIC DETERMINATION OF TOTAL AND ACTIVE ALKALI IN WHITE AND GREEN LIQUORS. Tappi, 47(3):167-170, March 1964. (Presented at the 17th Alkaline Pulping Conference, Tech. Assoc. of the Pulp and Paper Industry, Green Bay, Wis., Sept. 23-25, 1963).

Utilizing various modules of the Technicon Autoanalyzer, a method was developed for the measurement of total alkali in kraft white and green liquors. Relatively minor modifications make the same method suitable for measurement of active alkali. The method is based on overneutralization of the liquor sample, followed by colorimetric measurement of excess hydrogen ions through use of a buffered solution of methyl orange indicator. The procedure is suitable for use in the laboratory, where 20 samples an hour can be analyzed, or in the mill or pilot plant, where one or more liquor streams can be continuously monitored. (Author abstract)

4133 APTIC NUMBER 13220

Kinsey, J. A. and P. P. Wagner
AMINO ACID PRODUCTION BY A MITOCHONDRIAL FRACTION OF NEUROSPORA CRASSA. Proc. Natl. Acad. Sci. U. S., 55(2):408-410, Feb. 1966. 13 refs.

Crude mitochondrial preparations from Neurospora are able to produce leucine and a number of other amino acids in addition to isoleucine and valine. The amino acids produced by the crude preparations are those that are normally derived either from pyruvate or Krebs cycle intermediates. It was found that the production of amino acids is independent of externally supplied substrate, but is dependent on ATP and Mn(2+). It is believed that this process is a synthetic one. (Author summary modified)

4134 APTIC NUMBER 13481

Kirk, Donald G.
NITRIC ACID PREACHING OF HARDWOOD NEUTRAL SULFITE SEMICHEMICAL PULP. Tappi, 51(4):145-151, April 1968. 26 refs. (Presented at the Fourth International Pulp Bleaching Conference jointly sponsored by the Technical Association of the Pulp and Paper Industry and the Technical Section, CPPA, held in Toronto, Ont., May 1-4, 1967.)

Use of nitric acid in place of chlorine as a first stage bleaching agent for a hardwood NSSC pulp has been studied. The purpose was the production of a high nitrogen effluent from which a fertilizer material might be recovered and marketed. Study of nitric acid-stage variables showed the necessity of keeping the temperature low and bleaching duration short to prevent strength loss. This required the application of high nitric acid concentrations, which made reuse of the acid an economic necessity. Modifications using alcoholic nitric acid or nitric-sulfuric acid mixtures showed some potential strength benefits, while nitrous acid appeared to cause severe degradation. Extraction stage variables within broad limits were found to have little effect on pulp quality. Ammonia was found to have little effect on pulp quality. Ammonia was successfully substituted for caustic soda to increase the nitrogen content of the effluent solids. In general, substitution of nitric acid for chlorine in the first stage of a chlorine-extraction-hypochlorite sequence can be made to produce a pulp at least equivalent to the control pulp in all respects except for a slight yellowing effect. Chemical costs are high enough to render the process economically unattractive unless a fertilizer by-product can be marketed. (Author abstract)

4135 APTIC NUMBER 13212

Kjellman, B.
VENTILATORY EFFICIENCY, CAPACITY AND LUNG VOLUMES IN HEALTHY CHILDREN. Scan. J. Clin. Lab. Invest., 23(1):19-29, Feb. 1969. 48 refs.

The ventilatory efficiency of healthy children was investigated with a nitrogen wash-out technique. Nitrogen elimination time was considerably shorter than in adults and the reproducibility was lower. The reproducibility of wash-out volume, functional residual capacity (FRC) and lung clearance index (LCI) was as high for the children as that reported for adults. The mean and SD values of LCI agreed with those found in adults, investigated with the same equipment. The range of the Lichtneckert-Lundgren index of alveolar ventilation (IAV) was in agreement with that found in adults. Lung volumes and ventilatory capacity differed in some respects from the findings in earlier investigations of healthy Swedish children. (Author abstract modified)

4136 APTIC NUMBER 13420

Kleinert, Theodor N.
COTTON DEGRADATION BY SODIUM BOROHYDRIDE IN ALKALINE COOKING AT 180 C. Holzforschung, 20(2):43-45, April 1966. 21 refs.

Degradation of cotton cellulose at 180 C in sodium hydroxide solutions with and without additions of sodium borohydride was investigated. Evidence was found that under the conditions of alkaline pulping sodium borohydride had primarily a chain splitting effect upon the cellulose, similar to that observed when reacting cellulose in sodium borohydride solutions at room temperature, although at pulping temperature this effect was to some extent obscured by the strong thermal decomposition of the sodium borohydride. In addition to the cellulose degradation, sodium borohydride reduced and stabilized the newly formed end groups resulting in some increase of the cellulose residue compared with that in the blank experiments. Increase of the sodium hydroxide concentration of the liquor at constant sodium borohydride charge increased the chain splitting as indicated by the viscosity drop. Probably, because of the known stabilizing effect of the alkali, increase of the sodium hydroxide concentration delayed the decomposition of the sodium borohydride and thus prolonged its action upon the cellulose. Tentatively, free radical reactions during the action of sodium borohydride upon cellulose are briefly discussed. (Author's summary)

4137 APTIC NUMBER 13421

Kleinert, Theodor N.
DEGRADATION OF CELLULOSE BY SODIUM BOROHYDRIDE. Holzforschung, 20(2):41-42, April 1966. 6 refs.

treatment of cotton cellulose by sodium borohydride at room temperature resulted not only in reduction of oxidized groups (keto groups) initially present; but also in reductive chain splitting as measured by the viscosity decrease. The rate of this degradation was dependent upon the sodium borohydride concentration used. Slowdown of the viscosity decrease with increasing reaction time was found to be related to sodium borohydride consumption. After reaction, when bringing back the sodium borohydride concentration in the mixture to the initial level, the viscosity started to drop again at about the initial rate. It is suggested that the chain splitting takes place at the 1-4 beta-glucosidic linkages, and it seems that the new mild degradation method can be used for various polymers containing oxygen bonds. (Author's summary)

4138 APTIC NUMBER 13608

Kleinert, T. N. and L. M. Marraccini
DISTRIBUTION OF CHEMICALS IN COMMERCIAL WOOD CHIPS. I. ALKALINE PULPING STUDIES. TAPPI, 48(3):165-170, March 1965. 31 refs.

Various factors which influence penetration and distribution of kraft cooking chemicals in commercial sprucewood chips in the impregnation stage have been investigated. Hydrostatic pressure, temperature of the liquor, and liquor-to-wood ratio, together with diffusion phenomena, were major factors in the penetration of alkali into wood and its distribution throughout the wood tissue. These processes take place in an early stage of the treatment. The findings show that uniformity of alkali distribution has a bearing on residual lignin and pulp rejects. In general, under constant conditions of penetration, the amount of alkali taken up by the wood appears to be nearly proportional to the liquor concentration. The alkali is present in and on the wood in three distinct forms: (1) the alkali sorbed on the wood constituents, (2) the alkali dissolved in the liquid phase filling the capillaries and interstices of the wood, and (3) the alkali present in the liquid phase adherent to the chip surface. Surfactants interfere with alkali uptake and the subsequent cooking of softwoods. It is suggested that they are sorbed on wood constituents, occupying locations where the alkali should react during delignification. (Authors' abstract modified)

4139 APTIC NUMBER 13488

Kleinert, Theodor N.
STABLE FREE RADICALS IN VARIOUS LIGNIN PREPARATIONS. Tappi, 50(3): 120-122, March 1967. 23 refs.

Electron spin resonance (ESR) spectra of lignin preparations isolated from spruce wood by various methods, and of a few synthetic lignin-like polymers produced from coniferyl alcohol by enzymatic dehydrogenation or mild oxidation, were recorded and compared. The specimens exhibited single-line signals (first derivatives) without noticeable fine-splitting. However, the amounts of stable free radicals present, as indicated by the signal areas, varied, probably indicating differences in the stabilizing capacity of lignins prepared by different methods. At room temperature, no significant changes in the ESR spectra were observed when the specimens were stored for extended periods of time. Apparently, the presence of stable macroradicals or free-radical centers in the specimens, as indicated by the ESR signals, is evidence that free radical reactions have taken place during the specimen preparation. (Author's abstract modified)

4140 APTIC NUMBER 13606

Kleinert, T. N. and L. M. Marraccini
VAPOR-PHASE KRAFT COOKING OF BLACK SPRUCE - DELIGNIFICATION AND PULP STRENGTH PROPERTIES. (Part III of a series of ALKALINE PULPING STUDIES.) TAPPI, 48(4):218,223, April 1965. 32 refs.

The conditions under which short cycle kraft cooking (20 min or less of commercial spruce chips will produce bleachable grades of pulp were studied. The influence of such variables as concentration of the impregnation liquor (effective alkali charge), temperature and time of pressure impregnation, and temperature and duration of the steam cooking of the impregnated chips on pulp properties was considered. Provided the alkali charge was sufficient, increasing the impregnation temperature to 150 C reduced rejects and pulp lignin content, and also improved brightness. However, at 150 C, viscosity and strength properties tended to decrease. Above 150 C, and adverse effect on delignification was noted. Cooking to the same degree of delignification was studied between 180 and 190 C by shortening time according to the H-factor relationship and using three liquor concentrations (42.0, 52.5, and 63.3 g/liter) in chip impregnation. With the exception of folding endurance, temperature increase did not markedly affect pulp strength properties, but concentrations higher than 50 g/L lowered most strength properties. This effect is related to unconsumed effective alkali. When cooking to low rejects at screened yields of 45 to 53%, yield had no influence on pulp strength properties. At a screened yield of about 47% or less, and a pulp lignin content less than 6%, beating time at each freeness level investigated was constant. In contrast, at higher yields beating time increased with increasing yield and lignin content. Time of steam prehydrolysis at 170, and 185 C varied between 10 and 20 min, and vapor-phase cooking at 182.5 and 195 C between 15 and 20 min. Pulps low in ligrin and pentosan, with good strength properties, were obtained. (Authors' abstract modified)

4141 APTIC NUMBER 13197

Kleinfeld, Morris, Edward Stein, and Dolores Aguillardo
DIVALENT CATIONS ON ACTION POTENTIALS OF DOG HEART. Am. J. Physiol., 211(6):1438-1442, 1966. 10 refs.

The effects of Mn, Ni, Mg, Cd, Cu, Zn, Sr, and Ba on transmembrane action potentials of Purkinje and ventricular muscle fibers on dog heart were studied. The concentrations of cations administered varied between 0.001 and 0.00001 M. All except magnesium altered the action potential of both fibers.

Only Hg produced a marked alteration of action potential of Purkinje fiber with little change in ventricular fiber action potential. The most consistent alteration produced by the divalent cations was either a shortening or lengthening of plateau phase of action potentials of both fibers. Nickel and Mn lengthened the plateau phase, whereas Cu, Hg, Zn, Cd, and Sr shortened it. Copper, Hg, Zn, and Cd produced a greater degree of shortening of duration of action potential in Purkinje than in ventricular fiber. These four cations have an affinity for binding sulfhydryl groups, and the greater modifying effect on the Purkinje fiber produced by these four cations suggests that this fiber may be more sulfhydryl-dependent than ventricular fiber. The lengthening of plateau phase can be ascribed to a decrease in potassium conductance, and the shortening of the plateau phase can be attributed to an increase in K conductance. Changes in Ca conductance may also be implicated in plateau phase-a decrease in Ca conductance being associated with a shortening and an increase in Ca conductance with a lengthening of plateau phase. (Author abstract modified)

4142 APTIC NUMBER 13937

Klushin, D. N. and O. V. Nadinskaya
INVESTIGATION OF THE REACTION OF STANNOUS SULFIDE WITH SULFUR DIOXIDE. (K issledovaniyu vzaimodeystviya sul'fida olova s sernistym gazom). Text in Russian. Zh. Prikl. Khim., vol. 32: 482-485, 1959. 4 refs.

Continued study of the technology of tin extraction from lean ore is reported and secondary reactions in the process of stannous sulfide oxidation by atmospheric oxygen are discussed. Stannous sulfide was reacted with SO2 for 30 min at each 50 degree interval from 550-1100 C. The calcine was found, by x-ray and mineralogical analysis, to contain metallic Sn, SnS, Sn2S3(SnS-SnS2) SnS2, SnO2, and SnSO4. The absence of elemental sulfur is explained by the high vapor pressure of sulfur vapor at the experimental temperatures. The calcine weight reached a maximum at 700 C, corresponding to maximum SnSO4 content. Above 800 C, SnSO4 was practically gone, while the sulfide/oxide ratio became nearly equal to one, indicating oxidation of the sulfides.

4143 APTIC NUMBER 12997

Koizumi, Mutsuo, Hirokazu Mizutani, Yoshihiko Takamura, and Katsuya Nagata
HIGH SPACE HEAT RELEASE AND LOW EXCESS AIR COMBUSTION OF HEAVY FUEL OIL USING EXHAUST GAS RECIRCULATION METHOD. Bull. JSME (Japan Soc. Mech. Engrs)., 12(51):530-538, 1969. 8 refs.

The use of low excess air combustion in boilers for the reduction of corrosion of low-temperature heating surfaces results in increased soot formation. Where high-space heat release is used to obtain smaller boiler size, overheating of the combustion chamber walls results. An exhaust gas recirculation method, in which exhaust gases are mixed with combustion air, was applied to heavy fuel oil firing equipment fitted with a pre-combustion chamber in an effort to reduce the inherent problems in low excess air combustion. Combustion was almost completed in the pre-combustion chamber with a heat output of 10,000,000 kcal/cu m/hr and an excess air factor of 1.03. Soot formation was on the order of 70 mg/N cu m, being reduced as exhaust gas recirculation was increased. The acid dewpoint was slightly reduced by exhaust gas recirculation. Gas temperature in the pre-combustion chamber was lowered and eventually became stable with increases in recirculated exhaust gas.

4144 APTIC NUMBER 13786

Kota, S. and A. P. Krueger
AIR ION EFFECTS ON EDTA-INDUCED BLEACHING IN GREEN BARLEY LEAVES. Intern. J. Biometeorol., 12(4):331-342, 1968. 11 refs.

A severe chlorosis or bleaching is observed in the leaf tissues when green intact barley leaves are floated on the surface of a solution of EDTA (0.05 M, pH 7.0) and exposed to light. This EDTA-bleaching effect can be quantitated in terms of the tissue content of chlorophylls a and b. The EDTA-bleaching effect is weakened by exposing to either negative or positive air ions. The addition of casein hydrolysate (2%) also protects intact green leaves against EDTA-bleaching. This protective effect of casein hydrolysate is significantly augmented by either negative or positive air ions. The leaf tissue content of protochlorophyll is not uniformly affected by EDTA or air ions. A hypothetical mechanism involved in these phenomena is proposed. (Author abstract modified)

4145 APTIC NUMBER 13042

Kramarenko, I.P. and F.I. Grishko
A STUDY INTO LONG-TERM ACTION OF CARBON DISULFIDE UPON THE FUNCTION OF THE NEURO-MUSCULAR SYSTEM IN ANIMALS OF DIFFERENT AGE. Text in Russian. Gigiena Truda i Prof. Zabolevaniya, 13(5):33-35, 1969. 7 refs.

Age-specific differences in the function of the neuro-muscular system were studied following long-term exposure to carbon disulfide in concentrations of 50 and 120 mg/cu m. Carbon disulfide was found to bring about an increase in the excitation threshold and to lengthen the summation interval of doubled subliminal impulses. The extent of rheobase changes depended upon a concentration of the poison and was independent of the animal's age. Age-specific differences became noticeable in changes of the summation interval of doubled subliminal impulses; in young rats the rise in the indicator was more persistent than in adult animals. These differences became apparent only under low-intensity stimulant. With an increased concentration of carbon disulfide (up to 120 mg/cu m) variations in the summation interval of the impulses were roughly the same for young and adult animals. Investigations conducted on an isolated neuromuscular system demonstrated myoneural plates to be affected first in the course of carbon disulfide poisoning.

4146 APTIC NUMBER 12991

Kranz, Reimar
THE COMBINATION: GAS CHROMATOGRAPH-MASS SPECTROMETER FOR DETERMINING ORGANIC GAS TRACES. (Die Kombination Gaschromatograph-Massenspektrometer zur Bestimmung organischer Gasspuren). Text in German. In: Schnellmethoden und Automatisierung in der Analyse-Chromatographische Methoden, Dechema Monograph., 62(1102-1124), Frankfurt am Main, Deutsche Gesellschaft fur Chemisches Apparatewesen E.V., 1968, p. 169-184. 30 refs.

The quantitative determination of unknown organic gas traces and gas impurities in inorganic gases at concentrations of 1 ppm or less and at vapor pressures as low as 10 to the minus 12 torr presents considerable difficulties. A combination of a gas chromatograph and a mass spectrograph is described which allows both continuous and batch determination of organic trace gases. A special feature of this system is a glass fritte and a vacuum pump by which part of the helium carrier gas is removed and the trace gas concentration is increased. Operating parameters of the mass spectrograph are discussed and special cryogenic techniques are reported. The performance of the system is compared with a conventional flame detector. The sensitivity of 1 ppm with sample sizes of 1 microliter were reached by lowering the electron energy to 20 eV, which is below the ionization energy of helium. This method, however, alters the fragmentation of the gas molecules and thus renders the comparison of the spectra with the API file difficult. As examples, the analysis of two fluorite samples and a feldspar sample are presented. The qualitative spectra showed an abundance of organic compounds, ranging from methane to amino acids, indicating that these compounds may have other than biological origins. Possible industrial application of this method may be for determining the quality of feldspar, in particular its foaming properties. The fluxing properties of feldspar seem to be increased by the presence of amines and amino acids.

4147 APTIC NUMBER 13035

Kudsk, F. Nielsen
UPTAKE OF MERCURY VAPOUR IN BLOOD IN VIVO AND IN VITRO FROM HG-CONTAINING AIR. Acta Pharmacol. Toxicol., 27(2-3):149-160, 1969. 26 refs.

Experiments were conducted to confirm previous results on mercury vapor absorption by the lungs in human subjects, to clarify the mechanism by which mercury vapor is taken up, and to explain the inhibitory effect of ethyl alcohol. Results showed that the respiratory dead space for mercury vapor in human subjects corresponds to the physiological dead space, which indicates a complete alveolar absorption of mercury vapor in the lungs. The rate of uptake of mercury vapor in blood in vitro was determined; the vapor was absorbed by the blood and plasma at a higher rate during the first hour. Results showed a pronounced inhibitory effect of ethyl and methyl alcohol on the in vitro uptake of mercury vapor in blood, but isopropyl and n-butyl alcohol did not show similar inhibition. A possible involvement of the primary hydrogen peroxide-catalase complex or catalase only in the oxidation and uptake of mercury in erythrocytes was investigated, using aminotriazole as an inhibitor, either alone or in combination with methylene blue and glucose as a hydrogen peroxide-generating system. Aminotriazole had no effect. Methylene blue alone, and especially in combination with glucose, caused a pronounced accelerated uptake of mercury in the erythrocytes. (Author summary modified)

4148 APTIC NUMBER 13653

Kunin, T. I. and Yu. A. Lobanov
KINETICS OF ZINC HYDROSULFITE FORMATION. (Kinetika obrazovaniya gidrosul'fita tsinka). Text in Russian. Izv. Vysshikh Uchebn. Zavednii Khim. i Khim. Tekhnol., 8(6):921-925, 1965. 8 refs.

The kinetics of zinc hydrosulfite formation were studied in a reaction vessel with bubbling of SO2 gas through a water suspension of zinc powder at 10-60 C. Highest ZnS2O4 yields occurred at 30-50 C with a process duration of 1 hr and a solid-liquid phase ratio of 1:4-1:6. Zinc hydrosulfite formation rate is determined by the SO2 supply rate, the solubility rate of the gas being the limiting factor. The yield of zinc hydrosulfite approached 40 weight percent. It is noted that up to 2% metallic zinc does not enter the reaction and 4-6% is lost through decomposition of the reaction product.

4149 APTIC NUMBER 13901

Kuz'minykh, I. N., A. I. Bodionov, and Yu. S. Mishchenko
ABSORPTION OF NITROGEN OXIDES FROM WASTE GASES IN A PILOT PLANT COLUMN. (Absorbtsiya okislov azota iz khvostovykh nitroznykh gazov v poluzavodskoy barbotazhnoy kolonne). Text in Russian. Tr. Mosk. Khim. Tekhnol. Inst., vol. 33:43-47, 1961. 7 refs.

Data are reported from pilot operation of a sieve-plate bubbling column designed to remove NO and NO2 from waste gases down to the current sanitary norm of 0.1 vol % and using a 10% soda solution as the absorber. Total nitrogen oxide content in the incoming gas was about 0.3%, the flow rate was 1.3 m/sec, and the reflux density was 4.3 cu m/sq m-hr. Foam height was about 35-40 mm with the temperature maintained at 20-25 C. Maximum absorption (about 65-75%) took place at an acidity of 0.5. The degree of absorption did not change appreciably when gas flow rate was increased to 2 m/sec, but the absorption coefficient increased from about 200 to about 300 kg/sq m - hr - kg/cu m. Both degree of absorption and absorption coefficient were independent of reflux rate under the above conditions.

4150 APTIC NUMBER 13912

Laane, Jaan and Theodore L. Brown
MOLECULAR ADDITION COMPOUNDS OF TIN(IV) CHLORIDE. III.

THERMODYNAMIC DATA FOR 1:1 ADDITION COMPOUND FORMATION. Inorg. Chem., 3(1):148-149, Jan. 1964. 6 refs.

Observations on benzonitrile-tin(IV) chloride complexes are reported in addition to data relating to the interaction of tin(IV) chloride with a few oxygen donors. Equilibrium constants were evaluated as a function of a temperature to permit calculation of the enthalpy and entropy of complex formation. Additional compound formation in the carbonyl donor systems was measured by observation of the infrared carbonyl absorption. The results showed that a linear relationship held for a plot of entropy versus enthalpy. The also established the existence in solution of 1:1 addition compounds with tin(IV) chloride. The possibility of appreciable dimerization of the 1:1 compounds to form six-coordinate tin complexes is not consistent with the equilibrium data. The possibility that the solvent occupies a coordination position in benzene solution was ruled out. The evidence very strongly indicated a five-coordinate tin species in dilute solutions of tin(IV) chloride with donors.

4151 APTIC NUMBER 13305

Lassiter, J. W. and J. D. Morton
EFFECTS OF A LOW MANGANESE DIET ON CERTAIN OVINE CHARACTERISTICS. J. Animal Sci., vol. 27:776-779, May 1968. 7 refs.

Investigations were designed to examine the manganese requirements of ruminants and to observe some of the results of feeding a purified low-manganese diet to lambs. Four sets of twin ewe lambs were employed in an experiment so that one member of each twin was fed a purified control diet and the other an equal amount of the diet without manganese. By the 12th week of the experiment, lambs on the low-manganese diet showed clinical symptoms of joint pains, reluctance to move, and a tendency to 'rabbit hop' when forced. After 22 wks, lambs receiving the low-manganese diet exhibited reduced wool manganese levels while control lambs showed increased manganese levels. Control lambs had tibias that were longer, stronger and contained higher ash, calcium, and manganese levels. Control lambs also had higher serum alkaline phosphatase values. The heart and liver but not kidney or skeletal muscle of control lambs also had higher manganese levels. (Author summary modified)

4152 APTIC NUMBER 13423

Laver, M. L., D. F. Root, F. Shafizadeh, and J. C. Lowe
AN IMPROVED METHOD FOR THE ANALYSIS OF THE CARBONHYDRATES OF WOOD PULPS THROUGH REFINED CONDITIONS OF HYDROLYSIS, NEUTRALIZATION, AND MONOSACCHARIDE SEPARATION. TAPPI, 50(12):18-622, Dec. 1967. 23 refs. (Presented at the 52nd Annual Meeting of the Technical Assoc. of the Pulp and Paper Industry, New York, N. Y., Feb. 19-23, 1967.)

An improved method for the determination of the carbohydrates in woood pulps is based upon dissolution in 77.0% sulfuric acid followed by controlled hydrolysis in 3.0% sulfuric acid. The acid is neutralized to pH 5.0 with an aqueous barium hydroxide solution, and the resulting hydrolyzate is carefully concentrated to a syrup. The monosaccharides present are separated by gas-liquid chromatography of their trimethylsilyl ethers. They are determined quantitatively by comparison with myo-inositol, which is added as an internal standard. (Authors' abstract)

4153 APTIC NUMBER 13249

Layne, W. Robert and Roger P. Smith
METHYLENE BLUE UPTAKE AND THE REVERSAL OF CHEMICALLY INDUCED METHEMOGLOBINEMIAS IN HUMAN ERYTHROCYTES. J. Pharmacol. Exp. Therap., 165(1):36-44, 1969. 13 refs.

Methylene blue is accumulated by human erythrocytes when added to extracellular fluid. A limited and apparently nonspecific uptake of methylene blue can always be observed, but maximal uptake requires a substrate available to the pentose phosphate shunt and is, therefore, inferred to require reduced nicotinamide adenine dinucleotide phosphate (NADPH). The nonspecific uptake, however, is adequate to activate the shunt-linked methemoglobin reductase system. If nitrite is used to generate methemoglobin, maximal methylene blue uptake occurs secondarily to methemoglobin reduction. When present in erythrocytes contemporaneously, methemoglobin formation by phenylhydroxylamine (PHA) and methemoglobin reduction by methylene blue compete for the pentose shunt; therefore, net rates of methemoglobin reduction are slower than in the case of nitrite. Concentrations of PHA and unsubstituted hydroxylamine too low to generate methemoglobin still block NADPH-linked methylene blue uptake. Thus, when red cells exposed to high concentrations of PHA are washed, residual PHA prevents maximal methylene blue uptake but does not affect methemoglobin reduction rates. Even when red cells are washed after exposure to hydroxylamine, however, both NADPH-linked methylene blue uptake and methemoglobin reduction by methylene blue are blocked. Thus, hydroxylamine appears to produce an irreversible lesion of the pentose shunt. Another indication of irreversible damage to the red cell is 'sulfhemoglobin' accumulation. Although a concentration-dependent spectrum probably exists for these phenomena, they explain why a given methemoglobin level generated by nitrite is more effectively reduced by methylene blue than an equivalent level generated by PHA. The latter, in turn, is more efficiently reduced than a comparable methemoglobinemia generated by hydroxylamine. (Author abstract modified)

4154 APTIC NUMBER 13807

Le Bouc, F.
AEROTHERMOCHEMICAL STUDY OF FURNACES AND BOILERS. (Etude Aerothermochimique des Fours et Chaudieres). Text in French. Rev. Inst. Franc. Petrole, 22(5):849-892, May 1967. 28 refs.

A synthesis was made of the results obtained on experimental furnaces by the Fondation de Recherches Internationales sur les Flammes which emphasized the importance of recycling phenomena in furnaces and the major role of momentum at the burner nozzle in combustion development. The theoretical aspect of recycling is considered, together with experimental results obtained both on the furnace and on the cold model. The development of the chemical reaction of combustion was examined in terms of the various parameters that affect the combustion mixture. An interpretation was made of the thermal properties of flames obtained with different types of burners. (Author abstract modified)

4155 APTIC NUMBER 13348

Leach, S. J.
THE REACTION OF THIOL AND DISULPHIDE GROUPS WITH MERCURIC CHLORIDE AND METHYLMERCURIC IODINE. I. SIMPLE THIOLS AND SOLUBLE PROTEINS. Australian J. Chem., 13(4):520-546, Nov. 1966. 45 refs.

The polarographic behaviour of MeHgCl, (Me = methyl), MeHgI, HgCl2, neohydrin (3-chloromercuri-2-methoxypropylurea) and its iodo-derivative are described. Their chemical reactivity and -SH specificity were investigated and MeHgI was shown to have advantages as an -SH reagent on account of its high reactivity, stability, and 'ideal' polarographic behaviour. The reaction of protein -SS- groups with Na2SO3 proceeds slowly to completion in the presence of HgCl2 or MeHgI and it is shown that with bovine plasma albumin, ribonuclease, and insulin the polypeptide chains may be separated for preparative or structural studies under milder conditions than are customary. In the presence of urea at pH 9 the reaction is sufficiently rapid to form the basis of amperometric titration procedures for determining -SS- groups in eight intact proteins. The methods are especially valuable for proteins which have been previously converted to their -SH, -SO3(-), or -SSO3(-) derivatives since the destructive hydrolytic step may be avoided. The mechanism and stoichiometry of the reactions are discussed. (Author summary modified)

4156 APTIC NUMBER 13262

LeJohn, H. B.
ON THE INVOLVEMENT OF CA(2+) AND MN(2+) IN THE REGULATION OF MITOCHONDRIAL GLUTAMIC DEHYDROGENASE FROM BLASTOCLADIELLA. Biochem. Biophys. Res. Commun., 32(2):278-283, 1968. 8 refs.

The NAD-specific glutamic dehydrogenase from the aquatic mold Blastocladiella emersonii may be regulated by cations, notably Ca(2+) and Mn(2+), and by the adenylates, ATP, ADP, and AMP. This enzyme is localized on the surface of the mitochondria. It was found that the enzyme may be either activated or inhibited by cations. High pH levels favor Ca(2+) activation of the reductive amination of alpha-ketoglutarate and, at the same time, emphasize Ca(2+) inhibition of the oxidative deamination of glutamate. It is believed that Ca(2+) was affecting either the free enzyme of the enzyme-NADH complex. The plots of activation by AMP and ATP inhibition are included to emphasize the effectiveness of Ca(2+). Activation by ADP parallels the response shown by AMP. The effects shown by Mn(2+) were similar to those of Ca(2+), but less effective. These results indicate the presence of a mechanism whereby the glutamic dehydrogenase is directly regulated by ion translocations through the mitochondrial membrane.

4157 APTIC NUMBER 13067

Lenfant, Jaques, Jean Mironneau, Yves-Michel Gargouil, and Gerard Galand
ANALYSIS OF THE SPONTANEOUS ELECTRICAL ACTIVITY OF THE AUTONOMIC CARDIAC CENTER OF THE RABBIT BY INHIBITORS OF MEMBRANE PERMEABILITY. (Analyse de l'activite electrique spontanee du centre de l'automatisme cardiaque de lapin par les inhibiteurs de permeabilities membranaires). Text in French. Compt. Rend. Acad. Sci. (Paris), vol. 266, Ser. D:901-904, Feb. 26, 1968. 14 refs.

Measurement of changes in the action potential of rabbit auricle indicated the effect on permeability of the inhibitors tetrodotoxin, manganese, and tetraethylammonium. Tetraethylammonium, 20 mM, caused a doubling of rate, although the amplitude varied little. Tetrodotoxin in doses of 0.00001 g/ml caused complete disappearance of the action potential after 15 minutes. The action potential was most sensitive to the action of manganese. These selective membrane permeability inhibitors and their effect on the action potential serve to elucidate the mechanism of cardiac atomatism.

4158 APTIC NUMBER 13083

Lenz, B. J. and E. F. Kurth
HYDROTROPIC PULPING OF THE BARK FROM DOUGLAS-FIR AND THE PROPERTIES OF THE RESULTING PHENOLIC ACIDS. Tappi, 46(1):28-31, Jan. 1963. 12 refs.

The ability of various hydrotropic solutions to remove the bark phenolic acids from the bast fiber component of Douglas-fir bark was ascertained and compared the properties of the resulting phenolic acids with that extracted by aqueous sodium hydroxide solution. Pulping ability of several different hydrotropic solutions was compared at temperatures ranging between 120 to 180 C and with liquor-to-fiber ratios ranging between 8:1 to 14:1. From those tested, sodium cymenesulfonate, sodium ethylbenzene sulfonate, and sodium xylenesulfonate had the best hydrotropic effect on the bast fibers. Low pH liquors increased the rate of carbohydrate removal but did not increase the rate of phenolic acid removal from the fibers. High temperatures increased the solubility of the bast fibers but did not aid in selectively removing the bark phenolic acid. None of the hydrotropic solutions was as effective as dilute sodium hydroxide solution for solubilizing the phenolic acid material. Under the

conditions studied, the hydrotropic solutions were not good pulping agents for bark. They were not selective in their removal of bark phenolic acids nor did they produce bark phenolic acids which were significantly different from that obtained with sodium from the hydroxide extraction. Most of the bark phenolic acids recovered from the hydrotropic solutions on dilution with water had similar properties. A comparison of the hydrotropic and the sodium hydroxide phenolic acid products indicated they were very similar but not identical in nature. The phenolic acid preparation obtained at the 120 C extraction from the bast fibers had a 6:1 ratio of phenolic hydroxyl group to carboxyl group content. All of the other preparations had a ratio of 4:1. There were only slight differences in the paper chromatograms, methoxyl content, and ultraviolet spectra of the hydrotropic and sodium hydroxide bark phenolic acid preparations and no appreciable difference in their infrared spectra. (Author abstract modified)

4159 APTIC NUMBER 13536

Lepsoe, Robert
CHEMISTRY OF SULFUR DIOXIDE REDUCTION THERMODYNAMICS. Ind. Eng. Chem., 30(1):92-100, Jan. 1938. 11 refs.

The thermodynamics of sulfur dioxide reduction to elemental sulfur furnish fundamental information regarding maximum conversions attainable under any prevailing condition. For solid sulfur, the free energy equation given is valid between 0 and 100 C but is also used to advantage in a formal manner for high temperatures. Liquid sulfur consists of a mixture of S lambda and S mu or probably S2, S6, and S8. Due to the variable composition of gaseous sulfur, the total sulfur vapor pressure is not a criterion comparable with, for example, the vapor pressure of water or zinc. The vapor pressures of the various forms of gaseous sulfur can be calculated above the dew point--i.e., the field of unsaturated or superheated sulfur vapor. When the temperature is increased, S8 is first depleted, then S6, and at temperatures above 700 C, the vapor consists almost entirely of S2. At still higher temperatures S2 starts to dissociate into S, monoatomic sulfur. Only a few, unreliable thermodynamic data are available for carbon disulfide. There is evidence that a compound CS exists. The calculation of the reduction equilibrium for complete carbon monoxide plus sulfur dioxide may be based on any individual gas mixture of carbon monoxide and sulfur dioxide or carbon dioxide and S2. In the presence of carbon, sulfur dioxide is reduced by carbon monoxide continuously, i.e., the carbon dioxide is formed by the reaction of carbon monoxide and sulfur dioxide is again reduced to carbon monoxide. In the reduction of sulfur dioxide by hydrogen, the products of the reduction are controlled by three reactions: SO2 plus 2H2, H2 plus 1/2 S2, and 2H2O (g) plus 3/2 S2. In carbon monoxide-sulfur dioxide reduction, it can be assumed that hydrogen sulfide-sulfur dioxide equilibrium is established at 500 C. The effect of moisture in the sulfur dioxide-carbon reduction process is objectionable if present in appreciable amounts. It is felt that revised values for specific heat and free energy of sulfur dioxide and for specific heats of carbon monoxide and dioxide do not differ sufficiently to warrant recalculation.

4160 APTIC NUMBER 13802

Lewis, W. K. and P. D. Pies
INFLUENCE OF REACTION RATE ON OPERATING CONDITIONS IN CONTACT SULFURIC ACID MANUFACTURE. Ind. Eng. Chem., vol. 17:593-598, June 1925. 6 refs.

The data of Knietsch on the conversion of SO2 to SO3 by platinum at commercial operating temperatures demonstrates that the catalytic activity of platinum rises rapidly with the temperature to about 500 C, then goes through a maximum at about 525 C, beyond which it greatly decreases. The reason for this maximum is not clear and no experimental data are available to confirm it. Operating variables under the control of an engineer are the composition of the gas entering a converter, operating temperature, and the amount, character, and distribution of platinum used for a given amount of gas. Equations based on these conditions were derived to determine the capacity and efficiency of a converter and the optimum temperature at each stage of converter operation. They suggest that a decided increase in converter efficiency can be obtained by controlling the temperature of the gases. To achieve this, converters must be modified to absorb the heat of reaction and the sensible heat of the gases. Two types of converters employing this principle are suggested. In both, gases reach the bottom of the converter at about 400 C. The correct temperature gradient for one converter is maintained by by-pass valves. Gases are cooled by coils and contact masses. Gases passing through the second converter are cooled and diluted by auxiliary air valves. Adiabatic converters control the temperature. The temperature in the first converter after reaction can rise to 530 C without losing efficiency; the temperature in the second to 550 C.

4161 APTIC NUMBER 13841

Lewis, W. K. and P. D. Pies
INFLUENCE OF REACTION RATE ON OPERATING CONDITIONS IN CONTACT SULFURIC ACID MANUFACTURE. II. Ind. Eng. Chem., 19(7):830-837, 1927. 7 refs.

Using the data of Knietsch, the authors had previously calculated correct operating conditions for the catalytic oxidation of sulfur dioxide to sulfur trioxide in the presence of platinum. Further reaction rate data were obtained under strictly isothermal conditions simulating plant practice. From these data, a new equation was developed. While it does not explain the mechanism of the reaction, it accurately predicts conversion under any given set of circumstances. It applies equally to SO2 and O2 runs. Optimum operating temperatures calculated by means of the equation are found to correspond closely with good plant practice. A comparison is made between existing equations and the new one, and the shortcomings, both practical and theoretical, of the earlier forms are discussed in detail.

4162 APTIC NUMBER 13378

Lipshtein, R. A., T. A. Blagova, T. A. Chuikova, A. S. Avetisyan, E. M. Kosobokova, and E. F. Korytnyi
REACTIONS AND COMPOSITION OF REACTION PRODUCTS FROM THE BASIC COMPONENTS OF OIL FUEL ASH. Thermal Eng. (English translation of: Teploenergetika), 15(10):79-82, Oct. 1968. 7 refs.

At high temperatures, vanadium oxides and sodium sulfate combine to form the basis of ash deposits in the flow section of gas turbines and the heating surfaces of boiler plants operating on high sulfur-content fuel oil. The amount of the deposit, its capacity for being retained on the surface of the metal, and also vanadium corrosion susceptibility depend on the nature of the ash. The processes taking place during the interaction of V2O5 and Na2SO4 were investigated. The phase composition of the reaction products, as well as the loss in weight of the mixture due to this evolution, was determined by holding a given mixture of Na2SO4 or NaOH with V2O5 for 10 hrs at 800 C in a current of nitrogen or air. Data obtained indicated that products are formed mainly when V2O5 combines with Na2SO4, 3 V2O5 with 2 NaOH, and 6 V2O5 with Na2SO4. Composition of the reaction products was verified by x-ray analysis.

4163 APTIC NUMBER 13801

Loebl, Ernest M.
SEMICONDUCTORS AND CATALYSIS. Trans. N. Y. Acad. Sci. Ser. II, vol. 23:491-498, 1960-1961. 15 refs. (Presented at a meeting of the Section of Chemical Sciences, N. Y. Acad. Sci., Mar. 7, 1961.)

The difficulties and limitations of predicting chemical changes in a contiguous, generally fluid, phase of heterogeneous catalysis are described, and steps to minimize them are proposed. The separation of spatial from electronic effects is suggested to obtain a clearer insight into the correlation between the bulk properties of a catalyst and its catalytic activity. In this connection, the studies of catalysis on semiconductor surfaces is especially useful. The electron correlation can be studied in its pure form unencumbered by spatial factors (the steric configuration of atoms in various exposed surfaces of the catalysts), since the electronic character of the semiconductor can be varied extensively over a wide range through the addition of impurities in quantities too small to affect the lattice. In the course of a reaction, charges flow between different charge states (traps) of the semiconductor and its valence and conduction bands at rates than can be expressed in terms of capture cross-sections, thermal speeds, and energy levels. If these rates, rather than steps such as adsorption and desorption of unchanged reactants and products, surface diffusion, reestablishment of charge equilibrium within the semiconductor, are slowest, a clear correlation between electronic properties and reaction rate will exist; if any of the other rates are slow enough to be rate-determining, no such correlation will obtain. If only one kind of adsorbent (trap) is considered, the rate of adsorption or desorption at equilibrium can be observed experimentally. Here, the surface diffusion and charge equilibrium reestablishment rates can be omitted from consideration.

4164 APTIC NUMBER 13020

Lortie, J.
COMPUTER EVALUATION OF TOTAL OZONE OBSERVATIONS. Ann. Geophys., 25(1): 335-339, 1969. 2 refs. (Presented at the Tenth International Ozone Symposium, Monaco, Sept. 2-7, 1968.)

A Fortran IV computer program has been developed to quality control and calculate routine total ozone measurements and lamp tests for the Dobson Ozone Spectrophotometer. Sky and cloud nomograms are fed to it in the form of numerical arrays which can be easily amended. Further, it sets up files of correct data for research as well as a continuous record of lamp test results to monitor instrument stability. (Author abstract)

4165 APTIC NUMBER 13244

Lyubimova, M. N., F. S. Fayn, and N. S. Denyanovskaya
MANGANOUS ION-ACTIVATED ATPASE AND ADPASE IN LEAVES OF HIGHER PLANTS. (Mn(2+)-ATPaza i ADPaza v list'yakh vysshikh rastenii). Text in Russian. Biokhimiya, 31(5):1053-1056, 1966. 2 refs.

Manganous ion-activated ATPase and ADPase were found in leaves of all higher plants studied: trees, shrubs, and grasses. Clearly, both enzymes are native to the tissues of all plants. The weeds Elytrigia intermedia and Panicum dactylon exhibited greatest Mn(2+)-ATPase and ADPase activity with significant predominance of ATPase activity. No direct correlation between Mn(2+)-ATPase activity and plant motion was detected. Activity of Mn(2+)-ATPase was somewhat greater in bindweed and towel-gourd tendrils than in meadow grass tissue; activity in yellow mimosa was 2-3 times greater than in sensitive plant. It is proposed that Mn(2+)-ATPase and ADPase activity may characterize the intensity of vegetative processes.

4166 APTIC NUMBER 13259

Lyubimova, M. N., F. S. Fayn, and N. S. Denyanovskaya
SEPARATION OF APYRASE FROM MIMOSA PUDICA INTO ADPASE AND MANGANESE ION-ACTIVATED ATPASE. (Razdeleniye apirazy iz list'ev Mimosa pudica na Adfazu i Atfazu, aktiviruyemuyu ionami margantsa). Text in Russian. Biokhimiya, 31(4):805-814, 1966. 24 refs.

Adenosine diphosphatase, and specifically, manganese ion-activated ATPase, were found in homogenates and extracts of Mimosa pudica compound leaf. This was the first time ADPase was discovered in plant leaves, and it was found mainly in the intercellular fluid. Manganous ion-activated ATPase was found in blade and petiole tissue and in intercellular fluid. The first and second pulvini are poor in ATPase. Maximum temperature and pH are about the

same for both enzymes, i.e., 50 deg for homogenates and 45 deg for extracts. In contrast to ATPase, ADPase is acid-stable, retaining 28% activity after 15 min of boiling in 0.1N HCl and 27% after the same treatment in 5% sodium trichloroacetate.

4167 APTIC NUMBER 13933

Lyublina, P. I.
RELATIONS BETWEEN PHYSICO-CHEMICAL PROPERTIES OF HYDROCARBONS AND THEIR TOXICITY. (O svyazyakh fiziko-khimicheskikh svoystv uglevodorodov s ikh toksichnost'yu). Text in Russian. Gigiena i Sanit., no. 7:20-25, 1969. 4 refs.

A formula is suggested for preliminary calculation of toxicity indices on the basis of a correlation existing between the physicochemical properties of hydrocarbons and their lethal concentrations for mice and that of their maximal permissible concentrations in the air of industrial premises. From the molecular weights and boiling points of volatile hydrocarbons, it is possible to calculate the value of LD50 and various physicochemical constants of hygienic significance by means of a given nomogram. (Author summary modified)

4168 APTIC NUMBER 13425

MacGregor, Ronal R. and H. R. Mahler
RNA SYNTHESIS IN INTACT RAT LIVER NUCLEI. Arch. Biochem. Biophys., Vol. 120, p. 136-157, 1967. 51 refs.

A system was developed for the in vitro synthesis of RNA from nucleoside triphosphates in morphologically intact rat liver nuclei in a medium of low ionic strength. It requires all four nucleoside triphosphates (NTP's), Mg(2+) (or possibly Mn(2+), and is stimulated by NaF, NH(4+), an ATP-generating system, and several oligoamines. Spermidine or other oligodi-, or monoamines are required for the preservation of nuclear morphology at the incubation temperature. Incorporation is inhibited by RNase, DNase, actinomycin, Mn(2+), deletion of one NTP, Ca(2+), and calf thymus histones. Potassium chloride and NaCl have no effect at moderate concentrations but lead to nuclear lysis at high ionic strength. Mercaptoethanol, sonication, trypsinization, or puromycin treatment of the nuclei do not affect the incorporation. The system is highly active, and functions over a broad pH range from about 7.8 to 9.5. A stimulation of incorporation in vitro is observed if the fluorinated steroid hormone triamcinolone diacetate is injected into the intraperitoneal cavity of normal rats 3-8 hrs before sacrifice. This stimulation by hormone is similar in magnitude to one observed by means of an in vivo pulse of C14-orotate. The optical density profiles obtained from sucrose density gradients of RNA isolated from the nuclei after in vitro incubations and after in vivo pulses are similar, but the radioactivity profiles and double labeling experiments indicate extensive degradation of RNA with s values greater than 16 during the in vitro incubations. Differences in radioactivity profiles of RNA from control and hormone-treated rats after short pulses of C14-orotic acid can be interpreted in terms of stimulation of RNA anabolism by the hormone. No stimulation of incorporation has as yet been obtained by in vitro incubation of the nuclei with triamcinolone. (Authors' abstract)

4169 APTIC NUMBER 13534

Mackiw, V. N.
CURRENT TRENDS IN CHEMICAL METALLURGY. Can. J. Chem. Eng., 46(1): 3-15, Feb. 1968. 52 refs.

Recent developments in hydrometallurgy and pyrometallurgy are reviewed. Some processes presently in commercial operation and some in the developmental stage are presented from the standpoint of extraction of metals and from their fabrication into useful materials. The chemical reactions of various commerical processes are shown both graphically and chemically. New processes are presented for the treatment of Zn Cu, and Pb concentrates, complex Pb-Zn, Cu, FeS2 bulk concentrates, and Zn plant residues. A combination of roasting and hydrometallurgy for the recovery of molybdenum from molybdenite is displayed diagramatically. Laterite treatment and other investigations and reactions are reviewed. It is concluded that new products from new processes will evolve economically through a new technology.

4170 APTIC NUMBER 13691

Magnus, A., H. Giebenhain, and H. Velde
CALORIMETRIC DETERMINATION OF ADSORPTION ENTHALPIES. ADSORPTION OF SULFUR DIOXIDE ON CHARCOAL. (Calorimetrische Bestimmungen von Adsorptionswarmen. Adsorption von Schwefeldioxyd an Holzkohle). Text in German. Z. Physik. Chem. Abt. A (Leipzig), 150(3/4):285-298, 1930. 4 refs.

The heat content of the adsorption of 13 to 17,000 micromoles of sulfur dioxide on 15.75 g coconut charcoal was determined calorimetrically. First, a curve of integral adsorption enthalpies at 0 C was obtained. It was found that with increasing adsorbed quantities the molar adsorption enthalpy slowly decreased. For checking the measurements, it seemed desirable to add further small quantities of SO2 (about 30 micromoles) to the more or less loaded coal to determine the almost differential values again. The results confirmed the necessity of this step. The curve obtained this way agrees with the integral computed curve only above an adsorbed quantity of more than 2,000 micromoles (8 mg to 1 g coal). This can be explained by the fact that in the adsorption of small quantities of SO2 the gas pressure is accordingly lower and slows down the adsorption process. At termination of the half-hour experiment, no equilibrium conditions will yet have formed. The adsorbed gas will mainly be found on the easily accessible coal surface while in the pores the gas concentration will be much lower. With larger gas quantities, however, the adsorption process is faster, and by the end of the experiment, equilibrium conditions will be established. Thus, it may be concluded that the two results found independently of each other are correct to plus or minus 2% above an adsorbed quantity of 2,000 micromoles. With lower

adsorption quantities, a systematic error occurs. The enthalpy lies farther below the correct value the smaller the adsorbed quantities are.

4171 APTIC NUMBER 13634

Magnus, A., E. Sauter, and H. Kratz
CHARCOAL AS AN ADSORBING AGENT FOR GASES. (Ueber Holzkohle als Adsorptionsmittel fuer Gases.) Text in German. Z. Anorg. Allgem. Chem., 174:142-144, 1928. 3 refs.

In the adsorption of carbon dioxide on charcoal it could be observed that in zones of low gas adsorption the isotherms were unusually curved instead of gradually becoming linear, as was theoretically expected. This anomaly showed a strong dependence on the preliminary treatment of the coal. It became particularly pronounced at slow heating of the charcoal to high temperatures in a vacuum. The anomaly disappeared when the charcoal was boiled with hydrochloric acid and subsequently scrubbed with boiling water. At low pressure a linear dependence of the adsorbed amount on the equilibrium pressure was then observed. The degree of adsorption was much lower with cleaned than with uncleaned charcoal. Thus it can be assumed that uncleaned charcoal contains a certain amount of decomposable metal compounds in the form of alkaline or earth alkaline carbonates, which decompose when heated in a vacuum and regenerate again when they come in contact with carbon dioxide.

4172 APTIC NUMBER 13712

Magnus, A. and H. Giebenhain
THE ADSORPTION OF SULFUR DIOXIDE AND CARBON DIOXIDE IN THE AREAS OF SMALL EQUILIBRIUM PRESSURE. (Die Adsorption von Schwefeldioxyd und Kohlendioxyd im Gebiet kleiner Gleichgewichtsdrucke). Text in German. Z. Physik. Chem. Abt. A (Leipzig), 164(3/4):209-222, 1933. 8 refs.

The adsorption of carbon dioxide and sulfur dioxide on charcoal prepared from beechwood, coconut shells and cane sugar was studied down to very small equilibrium pressures. A measuring apparatus consisting of 2 MacLeod manometers connected via glass pipes with a buffer tank, a pump, an gas storage container and the adsorption flask was used. None of the measured isotherms were of the form observed by Polanyi and Welke on coal from Aussig with two critical points. The adsorption heat computed from the isotherms decreases steadily as a function of the adsorbed amounts, similar to the curve measured earlier by calorimetry. The minimum found by Polanyi and Welke in the area of small pressures could not be confirmed. For the adsorption of carbon dioxide on the used charcoal strongly curved isotherms were found at smallest pressures and gradually became linear. This may be explained by assuming that first the active points of highest adsorption potential are occupied, followed by physical adsorption with constant potential. Treatment with small amounts of oxygen makes the active points ineffective to some extent. Reactivation of the coal is accompanied by reappearance of the active points. Carbon dioxide (at 0 C) and sulfur dioxide (at 100 C) have the same loading density if the equilibrium pressure is the same. The shapes of the isotherms are very similar.

4173 APTIC NUMBER 13224

Manchot, W. and Hans Schmid
THE STUDY OF METAL NITROSO COMPOUNDS: A NITRIC OXIDE COMPOUND OF MANGANESE. (Zur Kenntnis der Metall-Nitroso-Verbindungen: Uber eine Stickoxyd-Verbindung des Mangans). Text in German. Chem. Ber., vol. 59:2360-2363, 1926. 3 refs.

A nitric oxide compound of manganese was prepared for the first time. $MnCl_2$ is brought in contact with potassium cyanide in aqueous or 30% alcohol solution, nitric oxide is rapidly absorbed. The amount of nitric oxide absorbed depends on the quantity of potassium cyanide used. As systematic experiments showed marked NO absorption took place beginning with a KCN concentration of 1 mole and increased with higher potassium cyanide quantities. At 5 moles KCN, a maximum of one mole NO per atom of manganese was absorbed. In one experiment, a pink precipitate formed in addition to the colored permanganate solution. As more potassium cyanide was added, no further precipitation was obtained; there was only a clear solution whose color intensity increased with higher NO binding at higher quantities of potassium cyanide. The experiments also showed that NO binding is irreversible. With aqueous solution, NO consumption is lower than with alcohol, particularly at lower KCN concentrations, and more precipitate forms. To prepare the compound, 4.90g Mn acetate, one mole H_2O, and 3.92g potassium acetate are dissolved in 10 cc water over a water bath. After cooling, 30 cc alcohol are added. Then, in a nitric oxide atmosphere, 6.5g (5 mol) potassium cyanide in 15 cc water is added at 0 C or at room temperature. A considerable but varying amount of gray-green $KMn(CN)_3$ forms, while the solution turns purple. After several precipitating and filtering operations, about 1 to 2 g of crystallized pure substance is obtained. The results of the analyses show complete agreement with the experiments on nitric oxide binding by $MnCl_2$ and potassium cyanide mixtures. Manganese is neither oxidized nor reduced. The compound corresponds to the sodium nitroprussside of Fe(II).

4174 APTIC NUMBER 13339

Mandelik, Bernard G.
CONVERSION OF SULFUR DIOXIDE WITH LOW IGNITION CATALYSTS. (Pullman Inc.) U. S. Pat. 3,282,645. 6p., Nov. 1, 1966. 5 refs. (Appl. Aug. 5, 1963, 7 claims).

A method of converting sulfur dioxide to sulfur trioxide which leads to a 98% conversion is described. A mixture containing SO_2 and oxygen at a temperature of about 750 to 850 F is contacted with a bed of oxidation catalyst. A portion of the SO_2 is converted to SO_3, and the mixture is heated to a

temperature of 1000 to 1175 F. Then it is cooled to about 675 F and passed through a second bed of oxidation catalyst. This bed has a layer of catalyst with an ignition point below that of the catalyst in the first bed and below 750 F. A second layer of catalyst has a higher ignition point than the first layer, in order to convert more SO2 to SO3. A low-ignition-point catalyst can be produced by impregnating standard catalysts with a suitable metal oxide such as P2O5 or MoO3.

4175 APTIC NUMBER 13385

Mannbro, Nils
KRAFT PROCESS LIQUORS FOR SODIUM BASE SULPHITE PULPING. PART 2. PULPING EXPERIMENTS AND DISCUSSION OF ECONOMICS. Svensk Papperstid. (Stockholm), 66(3):95-109, Feb. 28, 1963. 24 refs.

Sulfite cooking acids were prepared from carbonated green and black kraft liquors. Their pulping capacities were compared with pure sodium and calcium sulfite acids by cooks on spruce (Picea abies). All acids contained an equivalent amount of metal cations corresponding to 1.2% combined and with 7.3% total sulfur dioxide. Comparative bleachings comprising chlorination-caustic extraction-hypochlorite stages were applied on the pulps. Results show that green liquor produced either unbleached or bleached pulp possessing properties comparable to those of pulp cooked with pure sodium sulfite acid. Black liquor produced a pulp yield at medium Reynolds number which was competitive with that of the other sodium-base pulps. However, color and bleachability were inferior. This acid might be fortified with available base to give better results. Replicate runs of calcium - and pure sodium-base cooks and bleaching show that the chlorine consumption of sodium-base pulp is reduced to about 20% of that of the calcium pulp. On equivalent chlorine consumption basis, the yield gain by sodium-base pulping is 5.5%, as calculated on the corresponding yield of calcium-base pulp. The pulping yield and the chlorine consumption should be balanced for optimum process economy. Actually, sodium-base pulp should be cooked to a somewhat lower Reynolds number than calcium-base pulp. Under these conditions, sodium-base pulping of bleached grades, without recovery of the cooking chemicals, was found profitable. With regard to unbleached pulps, there is no justification for the sodium base in conventional sulfite cooking. For high-yield pulping, e.g., newsprint, the bisulfite method is more advantageous. (Author conclusions modified)

4176 APTIC NUMBER 13438

Mannbro, Nils
THE SULFIDE RECYCLE RECOVERY PROCESS PART I. SMELT COMPONENT SEPARATION AND RECYCLE RATIO. Svensk Papperstid., 65(23): 956-964, Dec. 15, 1962. 20 refs.

Most commercial processes for the recovery of chemicals from sodium-base sulfite spent liquors comprises two-stage combustion with the sulfide component of the smelt produced in the first combustion stage burned to form sulfur dioxide in the second stage. This sulfur dioxide and that of the flue gas are ultimately reacted with the sodium carbonate component of the smelt to form a sodium sulfite/bisulfite solution. By not processing smelt for hydrogen sulfide, the Sulfide Recycle Process permits the direct recycling of the sulfide component to the recovery furnace. Smelt is converted by separating sodium carbonate crystals from a concentrated sodium sulfide solution. The sodium sulfite is recycled to the furnace and converted there to sulfur dioxide and sodium carbonate. The sulfur dioxide is recovered from the flue gas by absorption in a liquor prepared from the separated sodium carbonate crystals. Crystallization of the soda involves the ternary system Na2S-Na2CO3-Na2SO4, and a formula was developed for calculating the increased smelt flow from the furnace and equilibrium smelt sulfidity. Calculation examples emphasize the importance of preventing oxidation of the sodium sulfide prior to its combustion in the recovery furnace. Successful operation of the Sulfide Recovery Process depends on complete conversion of the sodium sulfide to sodium carbonate and the lowest possible reformation of sodium sulfide in the discharged smelt. The process employs equipment and procedure standard in the pulp industry.

4177 APTIC NUMBER 13911

Manning, D. L., M. Blander, and J. Braunstein
ASSOCIATION CONSTANTS OF LEAD AND BROMIDE IONS IN MOLTEN SODIUM NITRATE-POTASSIUM NITRATE MIXTURES AND THEIR COMPARISON WITH THE QUASI-LATTICE THEORY. Inorg. Chem., 2(2):345-347, April 1963. 11 refs.

The association constants K1 and K2 for the formation of PbBr(plus) and PbBr2 were evaluated from electromotive force measurements in molten mixtures of NaNO3 and KNO3. The constants K1 and K2 in mole fraction units were respectively, 250 and 125 at 240 deg, 190 and 85 at 280 deg, and 170 and 70 at 300 deg when the solvent was equimolar NaNO3 and KNO3. A variation in the composition of the solvent changed the value of the association constants so as to give stronger binding as the proportion of KNO3 increased. The temperature dependence of the association constants, within the experimental error was predictable from calculations based on the quasi-lattice model. (Author abstract modified)

4178 APTIC NUMBER 13323

Marchok, Ann C. and Janice A. Wolff
STUDIES OF MUSCLE DEVELOPMENT. IV. SOME CHARACTERISTICS OF RNA POLYMERASE ACTIVITY IN ISOLATED NUCLEI FROM DEVELOPING CHICK MUSCLE. Biochim. Biophys. Acta, 155(2):378-393, Feb. 1968. 36 refs.

Nuclei isolated from developing chick leg muscle retain morphological characteristics found in fixed tissues. The RNA/DNA ratio in the nuclei decreases from 0.39 in the 11 day old embryo to 0.19 at 18 days of development. RNA polymerase

activity was measured in the intact nuclei and Mg(2 plus)-activated enzyme was found to change little during muscle development. In contrast, enzyme activity assayed in the presence of Mn(2 plus) decreased by one half from 11 to 18 days of embryonic development. These differences in enzyme activity persisted after (NH4)2SO4 stimulation. The RNA product of this system was determined in vitro by comparing the relative incorporation of each of the four ribonucleotide triphosphates. The RNA synthesized in the presence of Mg(2 plus) was rich in guanine, while the product of the Mn(2 plus)-activated system, in the presence or absence of (NH4)2SO4, was high in uridine. Preliminary experiments suggest that the observed differences in RNA synthesis during development are the result of changes in enzyme content or activity rather than DNA template availability. (Author summary modified)

4179 APTIC NUMBER 13843

Mars, P. and J. G. H. Maessen
THE MECHANISM AND THE KINETICS OF SULFUR DIOXIDE OXIDATION ON CATALYSTS CONTAINING VANADIUM AND ALKALI OXIDES. J. Catalysis, 10:1-12, 1968. 17 refs.

The oxidation of SO2 on a sodium-potassium-vanadium catalyst proceeds, as does that of SO2 on a catalyst containing potassium and vanadium, by rapid establishment of the equilibrium SO2 plus 2V(V) plus O2 yields SO3 plus 2V(IV). The rate of the reaction between oxygen and V(IV) is the rate-determining step for the process. On the basis of this finding, a kinetic formula was derived for expressing the reaction rate. When it was checked by means of isothermal and differential kinetic measurements on both types of catalysts, the expression was found to describe correctly measurements at 437 C and above. The values of both reaction rate and equilibrium constants calculated from the kinetic experiments are in good agreement with those derived from analytical determinations. (Author abstract modified)

4180 APTIC NUMBER 13414

Martin, D. A. and F. E. Prantley
SELECTIVE ADSORPTION AND RECOVERY OF SULFUR DIOXIDE FROM INDUSTRIAL GASES BY USING SYNTHETIC ZEOLITES. Bureau of Mines, Pittsburgh, Pa., Report 6321, 1963. 11 refs.

Synthetic zeolites were tried as selective adsorbents for recovering sulfur dioxide from synthetic gases and gases produced from gypsum decomposition. Initial adsorption tests, using the synthetic gases, indicated that three of these compounds, having sulfur dioxide capacities of up to 29 grams per 100 grams of adsorbent, were satisfactory. Regeneration studies showed that over 90% of the sulfur dioxide desorbed from the loaded beds was of sufficient purity for direct liquefaction. However, all zeolites tested lost adsorption capacity with repeated use. The zeolite determined to be the most promising in the preliminary synthetic gas tests was also evaluated for capability in adsorbing sulfur dioxide from gases produced by the thermal decomposition of gypsum. Despite small amounts of hydrogen sulfide in the gypsum decomposition offgases, good adsorption of sulfur dioxide was attained. The economic practicality of utilizing zeolites for sulfur dioxide removal from industrial gases was not evaluted, but the technical feasibility was demonstrated. (Author abstract)

4181 APTIC NUMBER 13505

Marton, Joseph
DETERMINATION OF LIGNIN IN SMALL PULP AND PAPER SAMPLES USING THE ACETYL BROMIDE METHOD. TAPPI, 50(7):335-337, July 1967. 10 refs. (Presented in part at the 51st Annual Meeting, Tech. Assoc. of the Pulp and Paper Industry, New York, Feb. 20-24, 1966.)

The acetyl bromide method of determining lignin in wood was extended to determine lignin in unbleached softwood pulps. Small (5-30 mg) pulp and uncoated paper samples are dissolved in an acetyl bromide-acetic acid mixture. The absorbance of the solutions at 280 mm is related to the absorptivity of reference lignin preparations. The calculated lignin content correlates excellently with Kappa number determinations. A correction is applied to compensate for background absorption at zero Kappa number. The precision of the lignin determination method is plus or minus 2 relative percent. It has potential advantages where micro sampling is involved and the pulps are modified or the pulp lignin contains solubilizing groups. (Author's abstract modified)

4182 APTIC NUMBER 13214

McAdams, H. T.
PROBABILITY FOUNDATIONS OF PARTICLE STATISTICS. Powder Technol. (Amsterdam), 2(5):260-268, June 1969. 6 refs.

Attempts to characterize systems of particles of varying geometry by a scalar quantity called particle size have given rise to a profusion of characteristic lengths often referred to as particle diameters. Typically, these diameters are a consequence of the measurement system, and further proliferation of terms results when characteristic lengths are statistically reduced to some version of mean particle size. Shape factors are introduced in an attempt to reconcile the various quantities and to serve as conversion factors from one system of measurement and statistical treatment to another. It is shown that the literature of particle diameters, particle statistics, and shape factors can be unified through the notion of an induced probability space. Applicable concepts of probability theory and the theory of stochastic processes are reviewed and their relevance to particle systems is demonstrated. (Author summary modified)

4183 APTIC NUMBER 13603

McDermot, H. L. and E. F. Lawton
THE ADSORPTION OF SULPHUR DIOXIDE BY GRAPHITE. Can. J. Chem., Vol. 37, p. 637-640, 1959. 5 refs.

Isotherms were determined at four temperatures for each of a number of graphites. Carbon with about 4% of oxygen on its surface adsorbed about seven times more sulfur dioxide than samples from which all the oxygen had been removed. It was concluded that the adsorption of sulfur dioxide provides a sensitive method for the detection of chemisorbed oxygen. Isotherms were also measured to study the temperature dependence of the branches of the hysteresis loop.

4184 APTIC NUMBER 13315

McGee, W. W. and J. D. Winefordner
USE OF A CONTINUOUS SOURCE OF EXCITATION, AN ARGON-HYDROGEN-AIR FLAME, AND AN EXTENDED FLAME CELL FOR ATOMIC ABSORPTION FLAME SPECTROPHOTOMETRY. Anal. Chim. Acta, 37(4):429-435, April 1967. 17 refs.

Atomic absorption flame spectrophotometry was investigated to develop an experimental system which would have maximum versatility without significant loss in sensitivity. A continuous source of excitation in conjunction with an argon-hydrogen-entrained air flame, an extended flame cell, a medium-dispersion monochromator, and a typical detection system was shown to give good sensitivities for the atomic absorption flame spectrophotometric measurement of 21 elements. Useful working curves over a 100-fold concentration range were obtained for each of the 21 elements using the simple experimental system. The advantages gained, such as limits of detectability comparable to or greater than the best literature values, were discussed.

4185 APTIC NUMBER 13236

McIntosh, D. C.
TENSILE AND BONDING STRENGTHS OF LOBLOLLY PINE KRAFT FIBERS COOKED TO DIFFERENT YIELDS. Tappi, 46(5):273-277, May 1963. 10 refs. (Presented at the Symposium on Interfiber Bonding, Div. of Cellulose, Wood, and Fiber Chemistry, Am. Chem. Soc. Atlantic City, N. J., Sept. 13, 1962).

Loblolly pine springwood and summerwood chips were cooked to different yields and further delignified by treatments with peracetic acid-sodium borohydride in order to separate the fibers. Tensile and bonding strengths of individual fibers were then determined. Summerwood fibers were superior to springwood fibers in tensile strength per unit cross-sectional area and in bonding strength per area available for contact. Individual summerwood fibers showed a rapid decrease in strength per fiber at high yield levels, but based on cross-sectional area of the fiber wall, strength showed no appreciable change until the lower yield levels were reached. Bonding strength was reduced at higher yield levels than fiber strength per cross-sectional area. In contrast, springwood fibers showed a gradual decrease in fiber strength with decreasing yield and were relatively constant in bond strength at different yields. Chemical analysis of summerwood pulps showed a general reduction in lignin content, degree of polymerization (D. P.), and hemicelluloses with reduction in yield. Because of the variables involved, no clear-cut relationship between tensile strength and any one chemical constituent was apparent. However, fiber strength (in grams) showed good correlation with mannan content and D.P. Because the chemical composition and structure of the surface of the fibers is not yet known, any relationship between bonding strength and chemical composition of the pulps is felt to be spurious. (Author abstract modified)

4186 APTIC NUMBER 12662

W. T. McKean, Jr., B. F. Hrutfiord, K. V. Sarkanen
KINETICS OF METHYL MERCAPTAN AND DIMETHYL SULFIDE FORMATION IN KRAFT PULPING. Tappi, 51(12):564-567, Dec. 1968. 10 refs.

Earlier rate studies on the formation of methyl mercaptan and dimethyl sulfide in kraft pulping were repeated under carefully controlled conditions. While the rate data obtained were in good agreement with earlier results, somewhat higher values were obtained for the rate constant of dimethyl sulfide formation (k2) at temperatures above 160 degrees C. This difference in results was traced to pH effects. It was possible to demonstrate that the rate of dimethyl sulfide formation is directly proportional to mercaptide concentration, while un-ionized mercaptan does not react with lignin methoxyl groups. As a consequence, the alkali charge in kraft pulping has a definite influence on the ratio of mercaptan to dimethyl sulfide that are formed in the cook. Noncondensibles escaping from the blow gases of mills cooking to alkali-exhaustion (-pH 10.5) are therefore more obnoxious than those from mills maintaining adequate residual alkalinity. Sufficient active alkali charge is therfore a recommended practice for older installations. (Author's Abstract) ##

4187 APTIC NUMBER 13327

McKenna, J. M. and N. I. Bishop
STUDIES ON THE PHOTOOXIDATION OF MANGANESE BY ISOLATED CHLOROPLASTS. Biochim. Biophys. Acta, 131(2):339-349, March 1967. 21 refs.

The photooxidation of manganese by isolated spinach chloroplasts was investigated to determine the possible relationship of this reaction to that of the normal Hill reaction. Comparable kinetics were observed for the effects of light intensity and temperature. The photooxidation of manganese is inhibited by typical poisons of Photosystem II, i.e., 3-(3,4-dichlorophenyl)-1, -1-dimethylurea, simazine, and sodium cyanide. Removal of light petroleum-soluble components from chloroplasts decreases their capacity for manganese oxidation. This effect is partially

reversed by the addition of plastoquinone A. Several additional components of chloroplasts were examined for their effects on manganese oxidation. Photosynthetic pyridine nucleotide reductase, purified ferredoxin, and a chloroplast diaphorase were ineffective at low concentration and inhibitory at high concentrations. Flavin mononucleotide (FMN), at low concentrations, causes a marked stimulation of manganese oxidation. Both the normal and FMN-stimulated reaction is inhibited by the flavin-antagonized acriflavin. The requirement for flavin, the need for oxygen in the photooxidation of manganese, and the observed inhibition by cyanide, suggest that peroxide is a product of the reaction and that peroxidase, and perhaps catalase, stimulates manganese oxidation through the removal of the newly formed peroxide. Although the photooxidation of Mn(2 plus) to Mn(3 plus) is dependent upon reactions of photosystem II, it cannot be concluded that the process is exclusively a photosystem II reaction. (Author summary modified)

4188 APTIC NUMBER 13593

McNaughton, W. R., T. H. Weldon, J. H. Hargrave, and L. V. Whiton
THE USE OF OXYGEN ENRICHED AIR IN THE METALLURGICAL OPERATIONS OF COMINCO AT TRAIL, B.C. J. Metals, 1(8):446-450, Aug. 1949.

The use of oxygen enriched air in suspension roasting has resulted in increased capacities. Dried concentrate is fed to a single burner, and oxygen is introduced at the burner fan with the gases from drying, the returned combustion gases from the waste heat boiler, and the required amount of new air. The product collected from the waste heat boiler is finished calcine, but the dust collected in the cyclones is returned to the combustion chamber where sulfate is decomposed. Gases from the cyclones go to a Cottrell precipitator. Discharges from the roasting hearth and the waste heat boiler are combined with the Cottrell dust to give the finished calcine. Using this process, individual roaster capacity has been increased from 120 tons/day to 150 tons/day. Gas strengths have been increased up to 5%, and heat recoveries increased to 15% using oxygen. Consideration is being given to the use of greater quantities of oxygen. The object is to further increase the capacity of the present roasting system, and to obtain increased concentrations of SO2 in the gases going to the acid plant for increased acid production.

4189 APTIC NUMBER 13230

Mela, Leena and Britton Chance
SPECTROPHOTOMETRIC MEASUREMENTS OF THE KINETICS OF CA (2=) AND MN (2=) ACCUMULATION IN MITOCHONDRIA. Biochemistry, 7(11): 4059-4063, Nov. 1968. 12 refs.

The cation-sensitive indicator murexide was used to measure Ca (2=) and Mn (2=) accumulation by rat liver mitochondria. The absorbance change of murexide caused by Ca (2=) or Mn (2=) was measured in a dual-wavelength spectrophotometer at 540-510 millimicrons. Close to 100% of the indicator was found to be in the medium outside the mitochondria and thus murexide gives a direct measure of the extramitochondrial Ca (2=) concentration. It is shown that the half-time of the accumulation of 380 micromoles Ca (2=) in the absence of permeant anions is about 15 sec; Mn (2=) accumulation is three to four times slower than Ca (2=) accumulation. However, 25 micromoles Ca (2=) added to the mitochondrial suspension together with 380 micromoles Mn (2=) accelerates the Mn (2=) uptake considerably. The permeant anion acetate facilitates the accumulation of the divalent cations. The kinetics of the Ca accumulation are compared with the kinetics of the concomitant intramitochondrial pH change. The murexide technique as a kinetic method for measuring divalent cation accumulation in mitochondria is discussed. (Author abstract modified)

4190 APTIC NUMBER 13604

Meller, Alexander and Erik L. Ritman
RETENTION OF POLYSACCHARIDES IN KRAFT PULPING. II. THE EFFECT OF BOROHYDRIDE ADDITION TO KRAFT LIQUOR ON PULP YIELD, CHEMICAL CHARACTERISTICS AND PAPERMAKING PROPERTIES OF PINUS RADIATA PULPS. TAPPI, 47(1):55-64, Jan. 1964. 22 refs.

The yield and chemical characteristics of kraft and borohydride-kraft pulps are compared. The addition of sodium borohydride to kraft liquors is found to increase the yield 5-6% by rendering polysaccharides resistant to the endwise type of alkaline degradation and by maintaining higher alkalinity throughout the cooking. Analytical data reveal that borohydride-kraft pulps have a much lower pentosan content, lower permanganate number, much higher hexosan content, slightly lower alpha-cellulose content, and considerably lower alpha-pentosan content than the kraft pulps prepared under identical cooking conditions. Borohydride-kraft pulps beat faster to a given freeness than kraft pulps, but, at the same weight and bulk, the strength properties of the handsheets prepared from the former are inferior. If tearing strength and breaking length of the sheets are corrected for yield differences, the strength differences tend to disappear, particularly with well-beaten pulps. Calculations based on rate data show that the decomposition of sodium borohydride added to the kraft liquor is practically complete when the temperature of 130 to 140 C is reached in pulping Pinus radiata wood under conditions used in the investigation. (Authors' abstract modified)

4191 APTIC NUMBER 13258

Merryman, Earl L. and Arthur Levy
KINETICS OF SULFUR-OXIDE FORMATION IN FLAMES: II. LOW PRESSURE H2S FLAMES. J. Air Pollution Control Assoc., 7(12):800-806, Dec. 1967. 18 refs.

The microstructure of 0.1 and 0.05 atm lean H2S-O2-N2 flames is developed using the mass spectrometric flame-sampling technique. The flame mechanism developed is in agreement with that determined from an earlier study on 1 atm H2S flames. The

formation of SO2 appears to be primarily related to the production of SH and the ensuing oxidation steps SH = O2 yields SO = OH and SO = O2 yields SO2 = O. While there is some question whether SO2 formation occurs via an SO or an S2O intermediate, the study does not give direct support to the role of S2O in the oxidation mechanism. However, the presence of significant quantities of free sulfur in the pre-flame zone may be indicative of S2O formation via SO = S yields S2O, and, possibly, via the disproportionation of SO, ISO yields S2O = SO2. Kinetic analyses of some of the pre-flame reactions indicate an apparent activation energy of 17,300 cal/mole for the decomposition of H2S. The specific rates for the reaction step H2S = O yields OH = SH, and for the oxidation of SO, SO = O2 yields SO2 = O were determined. (Author abstract modified)

4192 APTIC NUMBER 13322

Mildvan, A. S. and M. C. Scrutton
PYRUVATE CARBOXYLASE. X. THE DEMONSTRATION OF DIRECT COORDINATION OF PYRUVATE AND ALPHA-KETOBUTYRATE BY THE BOUND MANGANESE AND THE FORMATION OF ENZYME-METAL-SUBSTRATE BRIDGE COMPLEXES.
Biochemistry, 6(10):2978-2994, Oct. 1967. 38 refs.

The resonance of the methyl protons in the nuclear magnetic resonance spectrum of pyruvate was examined in the presence of Mn(2 plus) and pyruvate carboxylase, which contains enzyme-bound Mn. In both cases the longitudinal and transverse relaxation rates of the methyl protons are markedly increased. Comparison of the concentration of Mn(2 plus) and pyruvate carboxylase-Mn required to produce a comparable increase in the relaxation rates indicates the effect of Mn on longitudinal and transverse rates of the methyl protons is enhanced by factors of 20 and 100, respectively, when it is bound to pyruvate carboxylase. Addition of oxalate to the pyruvate carboxylase-pyruvate complex eliminates the increase. In the presence of pyruvate carboxylase, the longitudinal relaxation rate decreases, and the transverse rate increases with increasing temperature. The distance between the methyl protons and the enzyme-bound Mn is in the range of 3.5 plus or - 1.0 A in the pyruvate carboxylase-pyruvate complex. This distance is consistent with direct coordination of pyruvate to the bound Mn through either carbonyl or carboxyl ligands. The enhancement of the longitudinal relaxation rate by pyruvate carboxylase may be due to slowing of the rotation of the methyl group in the pyruvate carboxylase-pyruvate complex. The results obtained provide direct evidence for the existence of pyruvate carboxylase-Mn-pyruvate and pyruvate carboxylase-Mn-alpha-ketobutyrate bridge complexes in solution. The thermodynamic and kinetic properties of these complexes are consistent with their function in the catalytic process.

4193 APTIC NUMBER 13098

Mills, Richard R. and Donald G. Cochran
PURIFICATION AND PROPERTIES OF MYOKINASE FROM COCKROACH THORACIC MUSCLE MITOCHONDRIA. Comp. Biochem. Physiol., 18(5):837-845, May 1966. 19 refs.

Investigations were designed using column chromatography to establish the presence of myokinase in insect muscle mitochondria, and to study its possible role in the dephosphorylation of ATP. Results showed myokinase (ATP-AMP phosphotransferase) can be isolated from the thoracic muscle of the cockroach, Periplaneta americana, and the myokinase isolated was purified greater than 100-fold by ammonium sulfate fractionation and column chromatography on Sephadex. The purified enzyme required magnesium, but exhibited some activity in the presence of manganese or calcium. It was specific for the adenosine nucleotides, and had a pH optimum of 5.8 to 6.0 depending upon the buffer. The enzymatic reaction was markedly inhibited by fluoride at 0.02 M. The Michaelis constant values of 0.00031, 0.0015, and 0.00032 M were obtained for ATP, ADP, and AMP, respectively, and the equilibrium constant was calculated to be 0.48 in the presence of magnesium. (Author abstract modified)

4194 APTIC NUMBER 13248

Minkh, A. A. and I. N. Malysheva
THE EFFECT OF IONIZED AIR ON THE FUNCTIONAL MOBILITY OF THE SKIN COLD RECEPTORS. (Vliyaniye Ionizirovannogo Vozdukha na funktsional'nuyu mobil'nost' kholodovykh retseptorov kozhi). Text in Russian. Vestn. Akad. Med. Nauk SSSR (Moscow), 24(3): 35-40, 1969. 30 refs.

Artificially ionized air has a broad range of nonspecific action finding its expression in an increased resistance of the organism to oxygen deficiency, chronic effects of toxic dusts and gases, bacterial intoxication, gamma irradiation, etc. The chilling actions of negatively ionized air was studied by determining the 'functional mobility' of dermal cold receptors in 34 sportsmen. Functional mobility implies the ability of an organ to react to excitations of the external or internal environment with a larger or smaller number of elements composing it. The phenomenon is inherent in all organs and tissues. A statistically significant drop in the level of functional mobility was observed in the course of 18 to 19 daily exposures to negative aeroions, indicating reduced sensitivity of the skin to cold. Reduced functional mobility may be regarded as one of the indicators characterizing adaption of the organism to cold. Periodical inhalation of negative aeroions should facilitate acclimatization to low-temperature environmental conditions. (Author summary modified)

4195 APTIC NUMBER 13026

Mintz, Milton S., Robert E. Lacey, and Edward W. Lang
SEPARATION OF PULPING LIQUOR COMPONENTS WITH ELECTRODIALYSIS PROCESSES. TAPPI, 50(3):137-146, March 1967. 24 refs.

There are numerous variants of electrodialysis that permit the separation of components of complex solutions on the basis of their physical, chemical, and electrical properties. The common basis of electrically driven membrane processes and some of the applications of electrodialysis to pulping liquor separations that

appear to be technically feasible are shown. Various electrodialysis processes are suggested for the separation of the components of spent liquors from sulfite and sulfate pulping. These processes differ in the types of ion-selective and nonselective membranes that are used and arrangements of the feed and product streams through compartments formed by these membranes. Depending on the feed stream and the particular arrangement of membranes that it used, spent pulping liquors might be separated into recovered pulping chemicals, organic acids, lignin products, and hemicelluloses. (Authors' abstract modified)

4196 APTIC NUMBER 13916

Mirev, D., C. Balarew, L. Bojadziev, and D. Lambiev
III. ABSORPTION OF NITROGEN OXIDES IN THE VIBRATING LAYER OF SODIUM CARBONATE SOLUTIONS. (III. Absorption von Stickstoffoxyden in der vibrierenden Schicht von Natriumkarbonatloesungen). Text in German. Compt. Rend. Acad. Bulgare Sci., 14(4):345-348, 1961. 3 refs.

The absorption of nitrogen oxides in the vibrating layer of sodium carbonate solutions was studied under various conditions. Experiments were made with mixtures of gases containing 0.55 to 1.85% of nitrogen oxides, with a degree of oxidation of 20 to 60%. The effects of the degree of oxidation of NO to NO2, of the oxygen content of the gas mixture, of the rate of flow of the gas stream, of the concentration of the absorbent, and of temperature on the efficiency of separation, expressed as the ratio of the absorbed nitrogen oxides over their initial concentration, were studied. The optimal conditions for implementation of the process were established. The experimental findings are in agreement with the present views of the mechanism of oxidation of NO, according to which it proceeds vigorously on the gas-liquid inter phase. It is shown that with the absorption in the vibrative layer the content of nitrogen oxides in the exhaust gas is considerably lower than with the ordinary process of absorption by barbotage.

4197 APTIC NUMBER 13894

Mirzoyeva, T. M.
THERMODYNAMIC EQUILIBRIUM COMPOSITION AND THERMODYNAMIC PARAMETERS OF NITROGEN-OXYGEN HIGH-TEMPERATURE REACTION PRODUCTS. (Termodinamicheskiy ravnovesnyy sostav i termodinamicheskiye parametry produktov reaktsii azotno-kislorodnykh smesey pri vysokikh temperaturakh). Text in Russian. Izv. Akad. Nauk Azer. SSR, Ser. Fiz. Tekh. i Mat. Nauk, no 6:70-75, 1967. 8 refs.

Using data from the literature, calculations of composition and thermodynamic parameters were made for nitrogen/oxygen ratios (Q) of 1:1 and 1:3 at 2000-6000 K and 1-10 atm. Reaction is assumed to take place in a plasma column containing a mixture of N2, O2, NO, N, and O. Maximum NO yield was found to occur at about 3500 K for all values of Q. The following dependences are plotted: NO molar fraction vs temperature at 1 atm for both values of Q; NO molar fraction vs temperature with Q of 1 at 1.2 and 10 atm; enthalpy of gas vs temperature for Q of 1 and 1/3 at 1.2 and 10 atm; molecular weight of air and gas vs temperature for Q of 1 and 1/3 at 1.2 and 10 atm.

4198 APTIC NUMBER 13592

Mitchell, David R. and C. R. Smith
RECLAMATION OF REFUSE AT ILLINOIS COAL MINES. Illinois State Geol. Surv. Cir. 23, p. 45-52, 1938. 10 refs.

Coal refuse classified as pickings or the waste product from the hand-picking of coal on picking tables, conveyors, or railroad cars is a possible source of pyrite as a by-product in any process designed to recover coal from the pickings. Coal would come from the lightest end of such waste, and the pyrite, having a specific gravity of five, would come from the heaviest end. After the coal has been removed from the crushed waste, pyrite could be concentrated by jiggling, tabling, and possibly by flotation. Pyrite obtained from this process would meet sulfuric acid manufacturing requirements of 5% maximum carbon and 40% minimum sulfur. The economics of pyrite recovery are discussed in terms of 1929-1933 costs.

4199 APTIC NUMBER 13300

Monaghan, M. T. and P. G. Siddall
THE COMBUSTION OF SINGLE DROPS OF WASTE SULFITE LIQUOR - A PRELIMINARY INVESTIGATION. Tappi, 46(2):89-91, Feb. 1963. 13 refs.

The well-established technique for studying and evaluating conventional liquid fuels by observing the combustion of single drops was applied to the combustion of waste sulfite liquor. A preliminary investigation was conducted of the combustion in air in a small furnace of a sample of the liquor over the temperature range 500 to 810 C. The purpose of the investigation was to elucidate the processes occurring during combustion in comparison with conventional liquid fuels, to study the effect of ambient temperature on these processes, and to assess this single-drop technique as a possible means of evaluating and investigating different samples of sulfite liquor without having to resort to more elaborate tests. Measurements were obtained from motion picture runs for the change in the values of the ignition delay and burning times with ambient temperature, the reductions being from 12 to 1.75 sec and from 4.5 to 1 sec, respectively, for an initial mean drop size of 2000 microns as the temperature changed from 550 to 800 C. Above 550 C the following stages were observed during combustion. On insertion into the furnace the drop began to bubble, swelling violently and partially contracting, the viscosity increased, and the color changed until it formed a yellow solid which in turn was 'carbonized' to form a black, coke-like residue. This ignited suddenly, often preceded by a sudden flash of flame. During burning, it glowed brightly and on extinction left a hollow

residue of whitish ash. The significance of these results and possible extensions of the work are presented. (Author abstract modified)

4200 APTIC NUMBER 13237

Monsalud, Manuel R., Pablo M. Nicolas, and Felix G. Tadena, Jr.
BLEACHED SULFATE PULPS FROM WHITE LAUAN (PENTACME CONTORTA (TID.) MERR. AND ROLFE). Tappi, 48(7):430-432, July 1965. 2 refs.

Different bleaching processes were used and the effect of each on the bleached pulp yield and the pulp strength properties and brightness were determined. A three-stage bleach using a combined chlorine-chlorite in the first stage followed by caustic extraction in the second stage and sodium chlorite in the third stage produced a very good yield of high-quality bleached sulfate pulp of medium brightness. Another three-stage bleach of C-E-H sequence and two four-stage bleaches of C-E-C-H and C-E H-E sequences also produced good yields of high-quality medium-brightness paper pulps that were comparable to or better than the commercial bleached pulps used as references. (Author abstract modified)

4201 APTIC NUMBER 13526

Moolten, Sylvan E.
PULMONARY LYMPHATICS IN RELATION TO PULMONARY CLEARANCE, INTERSTITIAL FLUID AND THE PATHOGENESIS OF EMPHYSEMA. In: Tenth Aspen Emphysema Conference: Current Research in Chronic Obstructive Lung Disease, 191-221, June 1967. 40 refs.

Sixteen emphysematous lungs were studied to ascertain the role of the lymphatic system in emphysema. Lungs were fixed by dripping formalin into the bronchus while the lung was kept inflated by negative pressure. A node of negative pressure exists in the interstitial space where bifurcating respiratory bronchioles, small arteries, and lymphatic channels are held together within a common supporting sheath of fibroelastic tissue. This space constitutes a sump or reservoir, to which interstitial fluid is drawn from alveolar septa and directed into the lymphatic siphonage apparatus. The sump is assigned a role of commanding importance in maintaining the homeostasis of the interstitial environment of the alveolar septa. Harm may be expected when the outflow of tissue fluid is slowed by loss of negative gradient pressure necessary for sump action. The origin and continued propagation of centrilobular emphysema can be traced to impairment of sump action by repeated cough, by loss of radial traction of alveoli attached to peribronchiolar-periarterial fibroelastic sheath, by air trapping, or by interstitial fibrosis of the sump area itself. Air pollutants may harm sump tissue, destroying the fibrosis. Sump impairment allows metabolic wastes and other toxic substances to stagnate in alveolar interstitial tissue and initiate progressive atrophy.

4202 APTIC NUMBER 13482

Moore, Peter B.
POLYNUCLEOTIDE ATTACHMENT TO RIBOSOMES. J. Mol. Biol., 18(1):8-20, June 1966. 24 refs.

The binding of polynucleotides to ribosomes was studied by means of chemical and analytical determinations. Each 70 soluble Escherichia coli ribosome has one site where it binds polyuridylic acid (poly U) in the presence of magnesium ions. Polycytidylic acid (poly C) binds to ribosomes under the same conditions as poly U. Poly U can completely displace poly C from ribosomes. The ribosome thus appears to have a single site for binding polynucleotides of several types. The Mg(II) optimum of the interaction is 0.01 M. No binding is seen at 0.001 M - Mg(II) and the binding at 0.02 M is no greater than the binding at 0.01 M. Magnesium ions are not specifically required for the interaction. Ca(II) and Mn(II) at 0.01 M and spermidine at 0.001 M are equivalent to 0.01 M Mg(II). Attempts were made to demonstrate a supernatant enzyme and/or a soluble RNA requirement for polynucleotide binding. No such requirement can be demonstrated. (Author abstract modified)

4203 APTIC NUMBER 13692

Moravietz, W.
THE THERMAL OXIDATION OF IRON SULFIDE WITH SULFUR DIOXIDE TO ELEMENTARY SULFUR. (Die thermische Oxydation von Eisensulfid mit Schwefeldioxyd zu Elementarschwefel). Text in German. Z. Elektrochem., 57(7):539-548, 1953. 11 refs.

Under the influence of SO2 and at higher temperatures, pyrite splits off its sulfur in two steps. The first step is a thermal dissociation. The monosulfide which is formed in this process is oxidized to magnetite in a second step. To determine the equilibrium of the oxidation of FeS with SO2, a sample hung from a scale by a quartz thread was exposed to SO2 whose partial pressure was regulated by adding nitrogen. The quartz glass vessel in which the reaction took place was heated and the temperature was measured by a thermocouple. The scale had a sensitivity of 0.1 mg and could be loaded with a maximum of 200 g. The experiments were performed with temperatures of 620, 720, 820, and 920 C and with SO2 partial pressures of 0.9, 0.5, and 0.1 atm. For equal SO2 partial pressures, the S2 partial pressures yield an almost straight line. Also, the values for the reaction equilibrium yield a straight line at equal SO2 partial pressures. At 0.5 and 0.9 atm SO2 initial pressure, these values are almost the same at equal temperature. At 0.1 atm, however, they are considerably smaller. The reaction speed of the oxidation of FeS in the presence of SO2 is measured on spheres of synthetic FeS. It is determined by the diffusion speed in the pores of the magnetite formed. From the spherical analogue of Fick's first law, a measured diffusion constant is obtained which agrees well with the theoretical constant computed with a mathematical model and molecular kinetic data.

4204 APTIC NUMBER 13309

Morgan, Richard S., Henry S. Slayter, and David L. Weller
ISOLATION OF RIBOSOMES FROM CYSTS OF ENTAMOEBA INVADENS. J. Cell Biol., 36(1):45-51, Jan.-Mar. 1968. 17 refs.

A reproducible method for the preparation of 75S ribosomes from cysts of Entamoeba invadens is presented. The method depends on the inactivation of the cyst's ribonuclease by high levels of Bentonite. The ribosomes are found to be extremely sensitive to ribonuclease, and to be stabilized by the addition of manganous and calcium ions to the magnesium customarily employed. The ribosomes are believed to originate from the chromatoid bodies of the organism. (Author abstract modified)

4205 APTIC NUMBER 13930

Mueller, Ernst and Heinrich Barck
ON THE DECOMPOSITION OF NITRIC OXIDE BY HEATING WITH METALS. (Uber die Zersetzung von Stickoxyd beim Erhitzen mit Metallen). Text in German. Z. Anorg. Allgem. Chem. vol. 129: 309-320, July 19, 1923. 3 refs.

The question of whether small pieces of heated wire of various metals would be useful in reducing nitric oxide was investigated. It was hoped that this process could then be used in the microanalysis of organic compounds. Copper with zinc impurities reduced up to 88% NO at 400 C. Pure Cu reduced only 45% NO. Details of the experiments and method of analysis are given. Reasons for the incomplete reduction and inconsistency in the results are probably due to nitride formation and the production of N2O. Silver does not reduce NO below 700 C. Iron reduces NO better than Cu. Brass reduced nothing below 600 C and 29% at 700 C. Tin is ineffective below 400 C, and above that, nitride is formed. Zinc does not reduce below 350 C, but reduces NO slowly and completely at 600 C. Bismuth produces Be2O3 at 400 C, reducing 73.6% NO. Lead reduces 86.6% at 600 C. Magnesium, Ca, and Al became slowly effective at 600 C. Mn reduces 68% NO at 400 C. Other metals tested were Cr, ferrochromium, lead superoxide, lead oxide, and vanadium trioxide. All quantitative conditions and experimental results are given.

4206 APTIC NUMBER 13284

Mukhopadhyay, Asit, T. R. Fisher, and G. E. Smith
SUBMERGENCE AND LIMING EFFECTS ON SOIL: I. CHANGES IN PH, E SUB H, AND MANGANESE UPTAKE BY RICE PLANTS. Soil Sci., 104(2):107-111, Aug. 1967. 11 refs.

The effects of submergence and lime treatments on soil growing rice, as reflected by changes in pH, redox potential, plant uptake of manganese, and yield of grain and straw were studied. The pH of both limed and unlimed soils stabilized (after an initial decline) at near 7.0 after 62 days of submergence. The redox potentials in all treatments declined sharply during the first two to three weeks of submergence, after which relative stability was attained. The manganese content of the rice plants at two stages of growth and of the straw and grain at maturity was much higher in that grown on the unlimed soil. Manganese toxicity was suggestive in the unlimed treatments, a condition probably reflected in the observed reduction of growth and yield. The changes observed within each of the soil treatments were examined with respect to the theoretical stabilities of iron and manganese minerals. A close relationship of redox potential and pH changes within the acid soil system to iron transformation is suggested. The difference in manganese uptake by rice plants grown on unlimed soil was related to the theoretical stabilities of several manganese minerals. (Author summary modified)

4207 APTIC NUMBER 13469

Murray, J. A., Herman C. Fischer, and Leonard S. Rolnick
SHRINKAGE OF HIGH-CALCIUM LIMESTONES DURING BURNING. J. Am. Ceram. Soc., 37(7):323-328, July 1954. 1 ref.

Twenty-eight high-calcium limestone samples were subdivided into forty-three samples for burning for 1 hr at four different temperatures above the dissociation temperature: 1750, 2050, 2250, and 2450 F. Shrinkages were measured and a wide variety of results obtained. Attempts to correlate this variation in shrinkage with chemical composition, spectrographic analyses, geological characteristics, and insoluble residues were not successful.

4208 APTIC NUMBER 13048

Musha, Soichiro, Masami Nukada, Toshimasa Okano, Shintaro Fudano, and Masaru Mizutani
STANDARDIZATION OF SULFUR DIOXIDE STANDARD GAS USED FOR THE CALIBRATION WITH SULFONAL AS A PRIMARY STANDARD. (Suruhonaru o ichiji hyojun to shite mochiiru koseiyo nisanka iou hyojun gasu no hyotei). Text in Japanese. Bunseki Kagaku (Japan Analyst, Tokyo), 18(3):349-353, March 1969. 7 refs.

Methods for standardizing SO2 gas used for the calibration of a measuring apparatus were studied. 2,2-Bis(ethylsulfonyl)-propane (sulfonal), which is used as a standard substance for organic elemental analysis, was used as a primary standard. Two standardization methods were studied. In the first method, sulfur oxides evolved by the combustion of sulfonal were absorbed in a hydrogen peroxide solution, and the resulting H2SO4 was determined by coulometric titration. The second method involved the deposition of sulfur oxides on Ag gauze as silver sulfate, which was converted to H2S by reduction with hydrogen. The H2S was absorbed in a zinc acetate solution. Methylene blue was produced in the usual way and its concentration was determined spectrophotometrically. The latter method is recommended for its accuracy and precision. (Author abstract modified)

4209 APTIC NUMBER 13666

Nagasawa, Sin
FUNDAMENTAL STUDIES OF ADSORPTION OF GASES AND VAPOURS BY ACTIVE BENTONITE. Tohoku J. Agr. Res., 4(1):75-95, 1953. 6 refs.

Adsorption of gases and vapors by active bentonite which was prepared from commercial bentonite and activated by acid and heat treatments was measured. Isothermal equilibrium was measured and the empirical formulas of Freundlich's type were determined for benzene, sulfur dioxide, ammonia, and water vapor. Each isoteric equilibrium and isobaric equilibrium was calculated, and expressed by empirical formulas. Each desorption equilibrium was measured. The hysteresis-like phenomenon was observed with benzene, water, and sulfur dioxide at several temperatures. Isosteric differential heat of adsorption was calculated. From those values, and from the desorption equilibrium, it was ascertained that capillary condensation might take place at high relative pressures. (Author abstract modified)

4210 APTIC NUMBER 13336

Nagata, Koichi
STUDIES ON THIOHYDROXAMIC ACIDS AND THEIR METAL CHELATES. V. INFRARED SPECTRA OF METAL CHELATES OF THIOHYDROXAMIC ACIDS. Chem. Pharm. Bull., 15(1):70-76, Jan. 1967. 10 refs.

Changes in band frequencies of the infrared spectra of some metal salts of thichydroxamic acids (I) and O-methylthichydroxamic acids (II) after deuteration of the metal complexes are reportd. The observed changes suggest that the salts include an oxine group in their molecules. Two bands at about 1600 per cm and 1430 per cm disappeared on deuteration, and new bands appeared around 1500 per cm and 1020 per cm. As a result of the shift of the OH deformation band from 1430 per cm to 1020 cm, the C=N stretching band shifted from 1600 per cm to 1500 per cm by the extinction of the vibrational coupling between the OH deformation and the C=N stretching band. Comparisons of band frequencies attributed to the oxine group and those of the corresponding derivatives (S-methyl derivatives and disulfides of I or II) revealed that some transitional metal salts have chelate structures, probably of the S-O coordinated type.

4211 APTIC NUMBER 13263

Neubert, Diether, Eckard Oberdisse, Monika Schmieder, and Inge Reinsch
SOLUBILIZATION AND SOME PROPERTIES OF VERTEBRATE MITOCHONDRIAL DNA POLYMERASE. Z. Physiol. Chem., 348(12):1709-1711, Dec. 1967. 21 refs.

The mitochondrial DNA polymerase was solubilized after disrupting the cell particles and removing the mitochondrial membranes to which the DNA remains attached. The DNA polymerase reaction studied in mitochondrial shows all the characteristics known for other DNA polymerases. All four nucleoside triphosphates must be present simultaneously in the reaction mixture to allow an incorporation of isotopic thymidine triphosphate (3H-TTP, 14C-TTP, or 32P-TTP). Inorganic pyrophosphate and a variety of DNA-complexing agents strongly inhibit the incorporation of labelled nucleotides into DNA. The possibility that the observed incorporation of 3H-TTP is due to a contamination of the mitochondrial fraction with nuclear fragments has been eliminated because the specific activity of the labelled mitochondrial DNA exceeds by a factor of 50 or more that of the nuclear DNA labelled under identical experimental conditions. Since the mitochondrial enzyme showed a higher activity with denatured (nuclear) DNA than with native DNA, the mitochondrial enzyme is thought to be able to copy the DNA template, but unable to catalyze the initiation step. It is believed that the synthesis of DNA, unique for mitochondria, may function independently from replication processes occurring in the nucleus.

4212 APTIC NUMBER 13696

Neumann, Berhard and Erich Goebel
ADSORPTION OF SULFUROUS ACID ON VANADIUM PENTOXIDE. (Die Adsorption von schwefliger Saure an Vanadinpentoxyd). Text in German. Z. Elektrochem., 40(11):764-765, 1934.

The catalyst most frequently used in the sulfuric acid contact process is V205. Since no adsorption measurements have yet been taken with this substance, adsorption of SO2 was studied. It was assumed that adsorption can take place only at low temperatures, since at higher temperatures SO2 reacts with V205. Vanadic acid with a density of 3.32 was used. Detailed description of the measurements has been given elsewhere so that only the results are discussed. At 20 C, a regular adsorption process takes place, but to a lesser extent than with oxides previously studied. At 760 mm, Fe203 adsorbed 3.27 cu cm, Cr203 7.78 Cu cm, and V205 only 0.40 cu cm of SO2. The situation changes at 100 C where the adscrbed amounts of SO2 decrease at lower pressures than at 20 C. At atmospheric pressure, considerably more SO2 is adsorbed. The longer the contact period between sulfur dioxide and V205 is, the more gas is adsorbed. The isotherm indicates beginning reaction between SO2 and V205. Thus at 100 C, the vanadic acid is increasingly reduced. At 500 C, adsorption is no longer of any importance to the catalytic process.

4213 APTIC NUMBER 13915

Neumann, Bernhard
SPECIFIC HEATS OF GASES FOR COMBUSTION ENGINEERING COMPUTATIONS. (Die spezifischen Waermen der Gase fuer feuerungstechnische Berechnungen). Text in German. Z. Angew. Chem., vol. 1:141-146, May 13, 1919. 30 refs.

Based on a critical evaluation of molar heat data from the literature, tables were compiled of instantaneous specific heats at constant pressure, and of temperatures between 0 and 3000 C, and of the associated mean specific heats per kg or per cu m of the following gases: H2, O2, N2, H2O, CO, CO2, SO2, and

air. Two detailed examples are given of computations of the heat content of flue gases and of the temperature of a flame using the tabulated data.

4214 APTIC NUMBER 13531

Nicholls, P. and W. T. Reid
FLUXING OF ASHES AND SLAGS AS RELATED TO THE SLAGGING TYPE FURNACE. Trans ASME (Am. Soc. Mech. Engrs.), 54:167-190, 1932.

Studies of the fluxing of coal-ash slags to increase the fluidity of the deposited ash were made using a platinum-wound furnace, supplemented by a gas furnace with a 32 in. by 28 in. hearth. A standard of fluidity desirable for easy tapping was established, and the results were expressed as the temperature necessary to produce this fluidity, designated the flow temperature. Values for flow temperature in terms of the chemical composition of the ash, or ash plus flux, were determined for a range of ashes found in American coals, and for additions of the following fluxes: iron ore, limestone, dolomite, fluorspar, saltcake, steel slags, and some less important minerals. It is deduced that limestone or dolomite would be the most economical material to use for slagging-type boilers, and the quantity of flux can be computed from a diagram. The investigation was carried to flow temperatures below 2400 F. A complete diagram is given for coal ash-lime-iron showing the flow temperature plotted against composition. (Author's Abstract Modified)

4215 APTIC NUMBER 13572

Nicholls, P. and W. T. Reid
VISCOSITY OF COAL-ASH SLAGS. Trans. ASME (Am. Soc. Mech. Engrs.), Vol. 62, p. 141-153, Feb. 1940. 8 refs.

A viscometer for measuring the viscosity of coal-ash slag up to 2900 F is described. Investigations using the instrument show that slags in only a relatively small portion of the field of compositions of coal ash have the melting characteristics of glasses and that, for most compositions, there is a distinct liquidus point. From the limited data available for this progress report, plots for viscosity are given for 2800,2600,2400, and 2200 F, as well as showing the liquidus lines for each temperature. The relation between flow temperature, as determined in earlier investigations for use with slag-tap furnaces, and viscosity and liquidus temperature is derived. When complete trilinear diagrams are available, accurate predictions can be made on the effect of mixing the ash of two coals or of the addition of the main constituents. Predictions of the relative fusion and clinkering characteristics of coals from the softening temperatures of their ashes may give erroneous comparisons, but the initial and fluid temperatures are an additional guide. (Authors' abstract modified)

4216 APTIC NUMBER 13344

Nilsson, H. Evert R. and Karl Ostberg
KRAFT PULPING WITH THE ADDITION OF HYDRAZINE. Svensk Papperstid., 71(3):71-76, Feb. 1968. 26 refs.

Reducing agents such as hydrazine increased the yield of kraft cooking. Large doses of hydrazine increased the pulp yield from both pine and spruce by about 10% and from birch by 2 to 4 %, calculated on wood basis. In addition, the pulp brightness was improved up to about 15 %. Exploratory cooks with addition of pyrogalloll and dithionite were also performed, but with less effect. It has been found that the higher pulp yield mainly originates from a stabilization of glucomannan in pine and spruce, and of cellulose in birch. This is in accordance with previous experience from kraft cooking of pine and spruce with addition of sodium tetrahydridoborate. Further preservation of birch xylan might have been obtained with a lower white liquor charge. Laboratory beating and paper testing of the pine and spruce kraft pulps showed the expected deviations from the normal kraft pulp properties. Thus, the higher yield pulps obtained by the addition of hydrazine possessed slower beating response, slightly lower tear strength and comparatively unchanged tensile and burst strength. (Author abstract modified)

4217 APTIC NUMBER 13683

Nobe, Ken and L. L. Wikstrom
CATALYTIC DECOMPOSITION OF NITROGEN DIOXIDE. Preprint, Am. Chem. Soc., Pittsburgh, Pa., Div. Water, Air Waste Chem., 268-273, 1963. 11 refs. (Presented before the Div. of Water and Waste Chem., Am. Chem. Soc., Los Angeles, March 31 - April 5, 1963).

Studies on the catalytic decomposition of NO2 in N2 and in air were carried out with CuO- and CeO2-alumina catalysts at 304 to 520 C at gas space velocities ranging from 1400 to 11,200/hr. With CuO-alumina catalysts and initial NO2 concentrations of 1260 ppm, 99% of the NO2 was dissociated to NO, N2, and O2. At higher flow rates, the conversion varied linearly with the gram weight of the catalyst per flow rate of the reactant in moles per sec, indicating that the rate of dissociation of both NO2 and total nitrogen oxides is zero order. At lower flow rates, the conversion approached a constant value. Specific rate constant values were determined for different temperatures, activation energy, and frequency factor of zero order reactions. At a given temperature, flow rate, and initial concentration, the conversion of NO2 to N2 and O2 in air was less than in N2. No distinct reaction order fits the data obtained for this reaction. CeO2 was more active than CuO between 480 and 520 C, but less active below 480 C. It is assumed that the catalysts selectively adsorbed NO2 on active sites which were on the order of 10 to the 11th power/sq cm.

4218 APTIC NUMBER 13290

Nordlie, Robert C. and Philip T. Johns
THE INHIBITION OF MICROSOMAL GLUCOSE 6-PHOSPHATASE BY METAL-

BINDING AGENTS. Biochemistry, 7(4):1473-1479, April 1968. 37 refs.

The possibility that rat liver microsomal glucose 6-phosphate phosphohydrolase is a metalloenzyme was investigated. The inhibitory effects of a variety of classical metal-binding agents on hydrolytic and inorganic pyrophosphate-glucose phosphotransferase, activities of the enzyme were studied by both 'immediate inhibition' and preincubation techniques. Inhibitions competitive with respect to glucose 6-phosphate and inorganic pyrophosphate, and noncompetitive with respect to glucose, were observed by the former technique with sodium azide, sodium cyanide, sodium oxalate, and 1,10-phenanthroline. These inhibitions were prevented by titration of the metal-binding agents with divalent cations prior to exposure of the former to the enzyme. An irreversible, time-dependent inhibition was noted in preincubation experiments with 1,10-phenanthroline, sodium azide, diethyl dithiocarbamate, and 8-hydroxyquinoline. These observations suggest that glucose 6-phosphatase is a metalloenzyme, and that protein-bound metal may participate in the binding of phosphate substrates, but not glucose, to the catalyst. Inhibitions observed with a variety of other organic compounds, including o-tyrosine, o-hydroxyphenyl acetate, and cysteine, also may involve their interaction with a metal at the active enzymic site. Inhibition of enzymic activity by a variety of divalent cations, in the absence of metal-binding agents, is also described. (Author abstract modified)

4219 APTIC NUMBER 13320

Norstedt, Inger and Olof Samuelson
DEGRADATION OF CELLULOSE BY ALKALINE HYPOCHLORITE. Svensk Papperstid. (Stockholm), 68(17):565-571, Sept. 15, 1965. 37 refs.

Cotton bleached with hypochlorite at pH 8.2 was hydrolyzed and the solution was analyzed by a combination of various chromatographic methods. In addition to the acids present in the hydrolyzate from unbleached cotton, appreciable amounts of the following acids were isolated and identified: gluconic, arabinonic, erythronic, glyoxylic, and cellobiouronic acids. Results show that carboxylic acid groups are formed as end groups at C-1 and C-2 in the last glucose unit in the cellulose molecule. Moreover, there is a cleavage of the glucose ring between C-2 and C-3 resulting in the formation of carboxyl groups and an oxidation along the cellulose chain at C-6 in the glucose unit. The following acids were isolated from hydrolyzates from both bleached and unbleached cotton: 2-O-(4-O-methylglucopyranosyl-uronic acid)-xylose, 4-O-methylglucuronic, glucuronic, formic, levulinic, glycolic, and lactic acids. (Author abstract modified)

4220 APTIC NUMBER 13488

O'Sullivan, W. J. and Mildred Cohn
MAGNETIC RESONANCE INVESTIGATIONS OF THE METAL COMPLEXES FORMED IN THE MANGANESE-ACTIVATED CREATINE KINASE REACTION. J. Biol. Chem., 241(13):3104-3115, July 10, 1966. 22 refs.

Stability constants for the manganese complexes of various components of the creatine kinase reaction, including possible buffers, have been determined by electron paramagnetic resonance (EPR). EPR and proton relaxation rate (PRR) studies indicated that such interaction as occurred between manganese and creatine kinase was nonspecific and relatively weak, unlike the interaction between manganese and pyruvate kinase. The maximum enhancement of the PRR induced by binding of manganese to the enzyme was estimated to be 1.5, and this was considerably reduced at high ionic strength. Enhancements of the PRR of 19.4 at 25 mc per sec for the ternary complex, creatine kinase-manganese-adenosine diphosphate, at pH 8.0 and 24 degrees and of 9.8 at 25 mc per sec for creatine kinase-manganese-adenosine triphosphate at pH 7.5 and 24 degrees were obtained. Values of the dissociation constants of the metal nucleotides from the ternary complexes were obtained with the use of PRR data alone or by a combination of PRR and EPR data. It was also possible to obtain estimates of the dissociation constants of the free nucleotides from their binary complexes with the enzyme. It is concluded that the equilibria measured by magnetic resonance methods corresponded to the equilibria among the kinetically active species. (Authors' abstract modified)

4221 APTIC NUMBER 13211

Oestreich, Charles H. and Mark M. Jones
THE EFFECT OF METAL IONS ON LABILE PHOSPHATES. III. THE ROLE OF THE METAL ION. Biochemistry, 6(5):1515-1519, May 1967. 25 refs.

The acceleration of the hydrolysis of acetyl phenyl phosphate monoanion by magnesium and calcium ions was found to be much more pronounced than in the case of the dianions derived from either acetyl or carbamyl phosphate. The rate of hydrolysis of acetyl phenyl phosphate is strongly base dependent in the presence of metal ions. This was also the case with other simple phosphate anions. Infrared and nuclear magnetic resonance (nmr) studies on D2O solutions of acetyl phosphate and magnesium sulfate showed no characteristics which could be assigned to chelate structures involving the carbonyl group. Infrared studies on D2O solutions of carbamyl phosphate led to the same conclusion. These results favor the view that the principal effect of the metal ion is to facilitate the attack of nucleophiles via charge neutralization rather than chelation, though they are consistent with the formation of a transient chelate ring in the transition state. In the ground state these phosphate anions appear to be coordinated to the metal by oxygens of the phosphorus only. (Author abstract modified)

4222 APTIC NUMBER 13291

Oestreich, Charles H. and Mark M. Jones
THE EFFECT OF METAL IONS ON LABILE PHOSPHATES. I. THE HYDROLYSIS OF ACETYL PHOSPHATE DIANION. Biochemistry, 5(9):2926-2931, Sept. 1966. 13 refs.

The hydrolysis of acetyl phosphate dianion is catalyzed by the divalent ions of Zn, Co, Mn, Ni, Ca, and Mg in aqueous

solutions of pH 5.0-8.0.. The rate of hydrolysis is dependent upon the specific metal catalyst employed, catalyst concentration, pH, temperature, and the particular buffer if one is employd. The rate of reaction was determined in three aqueous media by an indirect spectrophotometric procedure and by titration of the acid generated in the absence of buffer. The observed rate constants for the magnesium- and calcium-catalyzed systems are interpreted in terms of three simultaneous reactions: an uncatalyzed reaction, attack on an intermediate metal complex by water, and attack on the intermediate metal complex by hydroxide ion. Formation constants for the metal complexes of acetyl phosphate dianion with calcium and magnesium ions were estimated to be 7.7 and 5.7, respectively. (Author abstract modified)

4223 APTIC NUMBER 13023

Ohtsuka, Tadao, Yoshikazu Hasegawa, and Tatsuo Ono
HYDRODESULFURIZATION OF KHAFJI CRUDE OIL. III. EFFECT OF ASPHALTENE. Bull. Japan Pet. Inst., vol. 11, p. 3-9, May 1969. 5 refs.

Asphaltene is believed to cause a decrease in the activity of the catalyst in the hydrodesulfurization of crude or residual oils. Using the flow system and conventional cobalt-molybdate catalysts, the effect of asphaltene on the hydrodesulfurization reaction was studied. Feedstocks of various asphaltene content were prepared from Khafji crude oil. An efficient catalyst activity was maintained over longer periods in the case of low asphaltene content, while a decrease in activity was observed in the case of high asphaltene content. Hydrogen consumption was higher with the feedstock of high asphaltene content. The hydrodesulfurization reaction rate of Khafji crude oil containing 1.5% asphaltene was approximately twice that of crude-oil with 4.3% asphaltene content. The kinetics of asphaltene the removing reaction and of the desulfurization reaction were apparently of second order. A comparison was made of catalyst selectivity regarding the asphaltene removing and desulfurization reactions. (Author summary modified)

4224 APTIC NUMBER 13325

Olsson, Jan-Erik and Olof Samuelson
INORGANIC REACTIONS DURING POLYSULFIDE COOKING. Svensk Papperstid., 69(20):703-710, Oct. 1966. 14 refs.

From the changes in concentration of polysulfide, thiosulfate, and sulfide during the polysulfide cooking of pine, it can be concluded that about 60% of the polysulfide sulfur is decomposed by disproportionation. This reaction is predominant during an early stage of the cooking. The rest of the polysulfide sulfur is mainly consumed in reactions with the organic material, primarily oxidations in which the polysulfide is reduced to sulfide. During the cooking, the sulfide concentration passes through a maximum. Its increase is explained by its formation in these two reactions and its decrease toward the end of cooking by the formation of organic sulfur compounds. The thiosulfate concentration increases rapidly during an early cooking stage, and, after passing through a maximum, the concentration decreases slightly. The decrease is explained by the decomposition of thiosulfate into polysulfide under conditions used in sulfate cooking. (Author abstract modified)

4225 APTIC NUMBER 13346

Orsler, R. J. and D. F. Packman
THE DETERMINATION OF LIGNIN IN SULPHITE PULPING LIQUORS. Svensk Papperstid. (Stockholm), 67(21):855-859, 1964. 11 refs.

The lignin content of spent bisulfite pulping liquors was determined by ultraviolet absorption measurements and the method was developed so that the course of delignification could be followed during two-stage cooks of the Stora type. The relative advantage of measuring absorption at 205 millimicrons and 280 millimicrons are assessed. It was found that measurement at 200-205 millimicrons was satisfactory for liquors containing less than 5 g/L total SO2 even when they contained considerable amounts of hydrolysis products such as furfural. For liquors containing more than 5 g/L of SO2 but less than 0.5 g/L furfural the 280 millimicron region was preferable. Liquors containing more than these quantities of both interfering substances could be satisfactorily measured at 200-205 millimicrons after an oxidation and precipitation treatment to remove all sulfites and SO2. (Author abstract modified)

4226 APTIC NUMBER 13652

Ovchinnikova, Ye. N. and O. K. Davtyan
OXIDATION OF SULFUR DIOXIDE ON ACTIVATED CARBON BY THE LIQUID-CONTACT METHOD. (Ob okislenii sernistogo angidrida na aktivirovannom ugle zhidkostno-kontaktnya metodom). Text in Russian. Zh. Fiz. Khim., 30(8):1735-1738, 1956. 1 ref.

The oxidation of SO2 on the surface of activated carbon at room temperature with formation of a definite quantity of oxidation product which can be removed with water in the form of sulfuric acid was demonstrated. Above 220 C, the surface-oxidized product reverts to SO2. As the quantity of water sorbed by the carbon increases, the yield approaches a limit of 0.25 g H2SO4 per gram carbon. The rate of acid formation decreases as the acid concentration increases and is directly proportional to the square root of the product of the oxygen and sulfur dioxide partial pressures.

4227 APTIC NUMBER 13943

Paduchev, V. V., V. V. Toporova, and N. P. Diyev
INVESTIGATION OF THE REACTION OF LEAD SULFIDE WITH SULFUR DIOXIDE. (Issledovaniye vzaimodeystviya sul'fida svintsa s sernistym angidridom). Text in Russian. Zh. Prikl. Khim., vol. 34: 676-679, Jan.-April 1961. 6 refs.

Sulfur 35 isotope was used to study the reaction of lead sulfide with sulfur dioxide at 650 and 700 C. Data obtained contradict the so-called 'sulfate theory' of sulfide oxidation which proposes that under conditions of sulfating calcination, first the sulfur of the sulfides themselves is oxidized to anions SO3(2-) and SO4(2-) and that the metal oxides formed during calcination are only products of subsequent dissociation of the initially obtained sulfates. It now seems more likely that the sulfates formed do not retain sulfur of the original sulfides but acquire it later from the gas phase, i.e., the metal oxides appear ahead of the sulfates: 4MeS* plus 2SO2 yields 4MeO plus 2S*2 plus S2; 4MeO plus 4SO2 yields 4MeSO3; 4MeSO3 yields 3MeSO4 plus MeS.

4228 APTIC NUMBER 13352

Pady, S. M., C. L. Kramer, and P. Clary
PERIODICITY IN SPORE RELEASE IN CLADOSPORIUM. Mycologia, 61(1): 87-98, Jan./Feb. 1969. 37 refs.

Kramer-Collins spore samplers were used to sample Cladosporium in the field, greenhouse, and growth chambers. In a wheat field, Cladosporium sporulated abundantly on dead foliage and spores were released between 7 and 8 am. A specially designed growth tube permitted sampling of a culture of C. herbarum Link continuously for 6 to 10 days. In the greenhouse in March, peaks occurred at midday and spore release was correlated with rising temperatures, daylight, and declining relative humidity (RH). In a growth chamber at 70 F, light from 8 am to 4 pm, high night RH and low day RH, spores were released as the RH dropped. Evidence indicates that in Cladosporium, spores are produced at night, are mature by morning, but are removed only by flowing air of low RH. More knowledge of spore release is necessary to understand airborne flora. (Author summary modified)

4229 APTIC NUMBER 12980

Papasova, Maria P., T. Nagai, and C. L. Prosser
TWO-COMPONENT SLOW WAVES IN SMOOTH MUSCLE OF CAT STOMACH. Am. J. Physiol., 214(4):695-702, April 1968. 15 refs.

Cat stomach in vitro shows spontaneous activity of slow waves and spikes. The slow waves consist of an initial rapid component which is sodium dependent, is propagated and not correlated with contractions, and a second slow component which is calcium dependent, is abolished by Mn(2=), may not be propagated but is always found when contractions occur. Spikes may appear on the second component and enhance contractions. Both components of slow waves originate in longitudinal muscle. Ouabain reduces the first wave, initially stimulates spiking, and later reduces frequency of the second wave. Tetrodotoxin has no apparent effect on either slow-wave component. Frequency of spontaneous waves is reduced by low Ca and enhanced by high Ca, but this effect of Ca requires the presence of sodium. The first component is analogous to the slow waves of small intestine, the second to prepotentials and spikes of taenia coli. (Author abstract modified)

4230 APTIC NUMBER 13194

Papavasiliou, P. S., S. T. Miller, and G. C. Cotzias
ROLE OF LIVER IN REGULATING DISTRIBUTION AND EXCRETION OF MANGANESE. Am. J. Physiol., 211(1):211-216, 1966. 20 refs.

Rectal obstruction abolished the total-body loss of Mn54 in both manganese-loaded and jaundiced rats. Bile duct obstruction only diminished the excretion of the radioisotope, proving that several gastrointestinal routes excrete manganese. Excretion was exceedingly fast if the isotope was injected intraportally, but then the effect of bile ligation became enhanced. Furthermore, biliary ligation induced a rise followed by a decline in the concentration of Mn54 in the liver, whereas that of the natural metal, Mn55, increased. Ancillary experimentation linked these phenomena to absorption and rapid reexcretion of the metal. This enterohepatic circulation participated in regulating the excretion of manganese. The customary acceleration of excretion following moderate loads with manganese was abolished by blocking the bile duct. Acceleration could be induced in bile-ligated animals provided they were overloaded with metal. The sum of the data indicated that bile formation constitutes the main regulatory route under ordinary conditions, but, under conditions of overloading, auxiliary gastrointestinal routes participate. (Author abstract)

4231 APTIC NUMBER 13601

Parry, V. F.
LOW TEMPERATURE CARBONIZATION OF COAL AND LIGNITE FOR INDUSTRIAL USES. Combustion, 25(9):38-42, March 1954. 1 ref. (Presented at the American Institute of Chemical Engrs. Annual Meeting, New York, Dec. 1953.)

Attempts to develop dried lignite and char for use as direct fuels for power generation were reviewed. When coals having ASTM classifications up to and including high-volatile C bituminous were carbonized, the heating value of the pure char was 14,000 Btu/lb, because all the water and much of the oxygen has been eliminated. Pure char thus produced was characterized by high reactivity and ease of ignition. A prototype lignite drier installed in Rockdale, Texas in 1952 is described and its drawbacks discussed. When dried lignite is used as fuel, it is believed that two driers will be capable of supplying fuel requirements for an 80,000 kw unit. A prototype carbonizing unit, a heat electrostatic precipitator, was also considered and a diagram presented. Tar produced by this operation will be chemically investigated as soon as sufficient quantities are available.

4232 APTIC NUMBER 13317

Partridge, H. deV. and W. Howard Rapson
MILL OPERATION OF THE R-2 PROCESS FOR CHLORINE DIOXIDE GENERATION. Tappi, 44(10):698-702, Oct. 1961. 4 refs. (Presented at the 46th Annual Meeting, Tech. Assoc. of the Pulp and Paper Industry, New York, Feb. 20-23, 1961).

Three mill trials of the R-2 Process in existing generators have demonstrated that it is a safe, reliable, and efficient method for generating chlorine dioxide. The process involves continuously feeding three streams into a reaction vessel; R-2 solution, which is an aqueous solution of sodium chlorate and sodium chloride; concentrated sulfuric acid; and air to stir the reaction mixture and to dilute and remove the ClO2 and chlorine formed. The concentrated R-2 solution entering the generator immediately reacts in the acid medium to produce ClO2 and chlorine. The ClO2, chlorine, and air from the reactor pass through a packed tower where ClO2 and about 0.25 of the chlorine are absorbed in water. The remaining chlorine leaves the ClO2 absorption tower and may be recovered as sodium or calcium hypochlorite bleach in an auxiliary tower or venturi scrubber. This process has shown chemical cost savings of up to 6 cents per lb of ClO2, depending on the mill conditions. Maximum savings depend on full utilization of the by-products of the reactions, chlorine, salt cake, and sulfuric acid.

4233 APTIC NUMBER 13326

Peceny, Rudolf
DETERMINATION OF CELLULOSE, HEMICELLULOSE AND CELLULOSE XANTHATE BY MEANS OF OSCILLOPOLAROGRAPHIC METHODS. Svensk Papperstid., 70(21):719-724, Nov. 1967. 16 refs.

The oscillograph represents one of the instrumental developments of classical polarography. Among the oscillopolarographic methods, determination of the derivative of the potential-time curves offers special advantages for the analysis of cellulose and viscose. It has been shown that cellulose, hemicellulose, and cellulose xanthate in 2N NaOH solution exhibit three characteristic 'inverted peaks' or 'cut-in' on the derivative potential curves in oscillopolarography. The peak observed at Q = 0.65 could be attributed to the soluble pentosan component. The peak at Q = 0.75 corresponds to the soluble fraction and that at Q = 0.81 appears to be related to the gamma fraction. In addition to the peak at Q = 0.75, cellulose xanthate gave another peak at Q = 0.38 which is also characteristic of viscose by-products. The magnitude of the inverted peak at Q = 0.75 is concentration dependent, while its width decreases with decreasing gamma number. No significant effect of the degree of polymerization of the magnitude of the inverted peak was observed for cellulose and cellulose xanthate in the range 500-30 DP. Since it is possible to examine amounts as small as 0.001 mg of soluble cellulose or pentosan both qualitatively and quantitatively by oscillopolarography, the method seems suited to the examination of micro-inhomogeneities in pulps and for micro-scale work. In the optimal range, an accuracy of plus or - 5% can be obtained. (Author summary modified)

4234 APTIC NUMBER 13938

Pechkovskiy, V. V.
REACTION OF BARIUM AND CALCIUM CARBONATES WITH SULFUR DIOXIDE IN THE PRESENCE OF A REDUCING AGENT. (Vzaimodeystviye karbonatov bariya i kal'tsiya s sernistym gazom v prisutstvii vosstanovitelya). Text in Russian. Zh. Prikl. Khim., 32(9): 2189-2193, 1959. 9 refs.

The dependence of degree and completeness of formation of the sulfites, sulfates, and sulfides of calcium and barium on temperature (650-1000 C), content, and type of carbon-containing material (coke, charcoal), and also on SO2 concentration in the gaseous phase (10-20%) was studied. Data indicate that calcium carbonate reacts with SO2 in a reducing atmosphere at 700 C to form CaS, the degree of formation increasing with temperature at the same time that sulfate and sulfite formation decreases. As carbon content of the charge is decreased, the degree of sulfide formation decreases and the degree of sulfate formation increases. Coke showed low activity up to 900 C and in every case was less active than charcoal. Increasing SO2 content resulted in increased total concentration of sulfur-containing compounds of calcium and barium, although barium sulfide concentration was found to decrease somewhat; increasing the carbon content of the load can counteract this drop.

4235 APTIC NUMBER 13817

Pechkovskiy, V. V., A. N. Ketov, T. G. Mal'tseva, and V. G. Pridatchenkov
THERMOGRAPHIC STUDY OF THE REACTION OF SULFUR DIOXIDE WITH CALCIUM CARBONATE IN AN OXIDIZING ATMOSPHERE. (Termograficheskoye issledovaniye vzaimodeystviya sernistogo angidrida s karbonatom kal'tsiya v okislitel'noy atmosfere). Text in Russian. Izv. Vysshikh Uchebn Zavedenii, Khim. i Khim. Teckhnol., 6(4):991-996, 1963. 11 refs.

The possible usefulness of calcium carbonate as an absorber of SO2 and SO3 is supported by data from a thermographic analysis of the system CaCO3(CaO) - SO2(SO3) - air. Sulfur dioxide in an oxidizing atmosphere reacts energetically with calcium oxide produced by decomposition of calcium carbonate and limestone, calcium sulfate being formed through a sulfitation step. Calcium sulfite is the basic product at 300-500 C, calcium sulfate at higher temperatures (up to 1000 C). Calcium sulfate may also be formed through oxidation of SO2 to SO3 and reaction of the latter with oxygen and calcium carbonate. These chemical mechanisms are of importance in the lime method of removing SO2 from power station flue gases. Data both from the literature and from new experimental work were used in the study.

4236 APTIC NUMBER 13381

Pepper, J. M. and Warren Steck
THE EFFECT OF TIME AND TEMPERATURE ON THE HYDROGENATION OF ASPEN LIGNIN. Can. J. Chem., vol. 41:2867-2875, 1963. 17 refs.

A study was made of the hydrogenation of preextracted aspen sapwood meal under conditions where the lignin is degraded to identifiable products. By gas liquid chromatography, guaiacol, 4-methylguaiacol, 4-ethylguaiacol, 4-n-propylguaiacol, dihydroconiferyl alcohol were separated and identified. The relative abundance of these 10 compounds was determined in the chloroform-soluble product after hydrogenation using a dioxane-water (1:1) solvent medium, Raney nickel catalyst, an initial hydrogen pressure of 500 psi, and temperatures of 150, 165, 185, 195, 210, and 220 deg for a reaction time of 5 hrs and a temperature of 195 deg for times of 0, 1.3, 5.0, and 24 hrs. The best yield (52.2% of the Klason lignin) of such phenolic derivatives was obtained at a reaction temperature of 195 deg for 5 hrs. The significance of the observed variation in the yields of these compounds with time and temperature and the relationship of these yields to the structure of lignin is discussed. Evidence is presented in support of both gamma-alkyl ether and beta-aryl ether linkages in the lignin substance. (Author abstract modified)

4237 APTIC NUMBER 13064

Perreu, Jean
HEATS OF ADSORPTION OF HYDROGEN AND OXYGEN ON ACTIVE CHARCOAL. (Sur les chaleurs d'adsorption de l'hydrogene et de l'oxygene par le charbon activ). Text in French. Compt. Rend. Acad. Sci. (Paris), 226:907-908, March 15, 1948. 4 refs.

Heats of adsorption of hydrogen and oxygen on active charcoal were determined at 0 deg at varying concentrations of gas. For hydrogen, values of the integral heats ranged from 0.04 - 0.018 cal and from 1630 to 1290 cal, respectively. For oxygen, the differential heat decreased from 78,870 to 4200 cal/g as concentration increased.

4238 APTIC NUMBER 13575

Peskin, Richard L. and P. S. Yeh
RESULTS FROM A THEORY OF FUEL DROP IGNITION. American Inst. of Aeronautics and Astronautics, New York, Technical Information Service, 30p., 1966. 6 refs. (Presented at the AIAA Third Aerospace Sciences Meeting, New York, Jan. 24-26, 1966, Paper 66-70.)

The 'quasi-flame surface theory' has been generalized to include higher reaction orders and arbitrary stoichiometric ratios. The results of the computation of characteristic ignition curves for fuel droplets are presented. These results describe how changes in such quantities as reaction order, stoichiometric ratio and external oxygen concentration can affect the characteristic ambient temperature for auto-ignition of a fuel droplet. The results show that for larger drops the characteristic curve is relatively insensitive to value of activation energy when the temperature is normalized by the activation temperature; the higher the reaction order the higher the temperature needed for auto-ignition; the increase in latent heat requires higher temperature for ignition; the increase in stoichiometric ratio and the heat of reaction result in a decrease in ignition temperature; and the change in surface temperature has only a small effect on the ignition temperature. The relation between the external oxygen concentration and the ignition temperature shows that there is a critical oxygen concentration for minimum ignition temperature.

4239 APTIC NUMBER 13188

Pettersson, Sven and Olof Samuelson
URONIC ACIDS IN SULFITE SPENT LIQUOR FROM SPRUCE. Svensk Papperstid., 70(15):462-468, Aug. 15, 1967. 24 refs.

The following uronic acids were isolated from sulfite spent liquor by means of chromatographic separations on anion exchange resins: 2-O-(4-O-methyl-alpha-D-glucopyranosyluronic acid)-D-xylose, 4-O-methyl-D-glucuronic acid, 2-O-(alpha-D-galactopyranosyluronic acid)-L-rhamnose, 6-O-(beta-D-glucopyranosyluronic acid)-D-galactose, 2-O-(alpha-D-glucopyranosyluronic acid)-D-xylose, D-galacturonic acid, and D-glucuronic acid. The first two acids were present in larger amounts than the other species. The total amount of uronic acids in the liquor (calculated as hexuronic acids) was about 1 g/L. This indicates that the major part of the uronic acids removed from wood during cooking are destroyed. The increase in the content of fermentable sugars which can be gained by hydrolysis of the bicuronic acids present in the spent liquor is negligible. (Author abstract modified)

4240 APTIC NUMBER 13687

Pevnyy, N. I.
ADSORPTION AND DESORPTION OF SO3 ON CATALYSTS FOR OXIDATION OF SO2. (Adsorbtsiya i desorbtsiya SO3 na katalizatorakh dlya okisleniya SO2). Text in Russian. Zh. Fiz. Khim., 14(7):981-984, 1940. 9 refs.

The adsorption and desorption of SO3 at 450 and 500 C was studied experimentally with the following catalytic absorbers: chromatin-activated antimony; platinized asbestos; platinized silica gel; barium-aluminum-vanadium; and barium-vanadium. The most effective catalysts were found to have the greatest desorption rate and are ranked as listed above according to decreasing desorption rate at 450 C. At 500 C, the differences in desorption rates are negligible.

4241 APTIC NUMBER 13265

Pierce, J. A.
A STUDY OF THE REACTION BETWEEN NITRIC OXIDE AND HYDROGEN SULPHIDE. J. Phys. Chem., 33(1):22-36, Jan. 1929. 15 refs.

The conditions of the reaction between nitric oxide and hydrogen sulfide were studied at temperatures between 28 and 100 C.

Reaction conditions varied by conducting a series of experiments in, (a) a plain glass chamber, (b) with added silica gel, and (c) with added glass wool. The reaction proceeded under all conditions; the slowest velocity was obtained when no catalyst was used. Increased surface provided by glass wool accelerated the reaction to a rate comparable to that with silica gel. The reaction is heterogeneous, as confirmed by the slowing of the reaction in the presence of inhibiting colloidal sulfur. The stoichiometric expression for the reaction is: 2NO + 2H2S yields 2H2O + 2S + N2. A negative temperature coefficient was found and ascribed to decreased association of NO to form N2O2 at the higher temperatures. The accumulation of colloidal sulfur as a result of the reaction is the cause of the inhibitory effect observed. It appears to be a mechanical coating of the catalyst. The glass wall of the reaction chamber and the filaments of glass wool were acted upon by water and H2S with formation of amorphous silicon dioxide. (Author summary modified)

4282 APTIC NUMBER 12169

J. N. Pitts, Jr., and J. K. S. Wan
THE PHOTOCHEMISTRY OF KETONES AND ALDEHYDES. Preprint, California Univ., Riverside, Dept. of Chemistry, 103p., Dec., 1966. 272 refs.

With the development of modern experimental techniques, particularly in analysis of complex mixtures by liquid-gas chromatographic methods, photochemistry has assumed an increasing importance in studies of free radical reactions, energy transfer processes and the synthesis of new and unique organic compounds. Perhaps the most widely studied class of compounds, historically and today, is that containing the carbonyl chromophore. The absorption spectra of most carbonyl compounds fall in the experimentally readily accessible region of the ultraviolet where quartz has high transmission and mercury arcs produce strong line emission spectra. In order to obtain a thorough understanding of the photochemistry of a given system, one must elucidate the entire "life history" of the photoprocess; this includes the primary process (es) and all secondary reactions in the system.##

4283 APTIC NUMBER 13233

Pogo, A. O., V. G. Allfrey, and A. E. Mirsky
EVIDENCE FOR INCREASED DNA TEMPLATE ACTIVITY IN REGENERATING LIVER NUCLEI. Proc. Natl. Acad. Sci. U. S., 56(2):550-557, July-Sept. 1966. 34 refs.

The RNA synthetic capacity of regenerating liver nuclei exceeds that of normal liver nuclei. This change is due to an increase in the number of DNA sites available for transcription in the RNA polymerase reaction. Nuclei from normal liver respond to high salt concentrations by a change in physical state, an increased synthesis of RNA, and a change in the composition of RNA toward higher adenylic and uridylic acid contents. The stimulatory effects of added salts decreases during cell growth in the nuclei from regenerating liver. These results indicate a change in the structure and properties of the chromatin during gene activation. (Author summary modified)

4284 APTIC NUMBER 13232

Pogo, A. O., V. C. Littau, V. G. Allfrey, and A. E. Mirsky
MODIFICATION OF RIBONUCLEIC ACID SYNTHESIS IN NUCLEI ISOLATED FROM NORMAL AND REGENERATING LIVER: SOME EFFECTS OF SALT AND SPECIFIC DIVALENT CATIONS. Proc. Natl. Acad. Sci. U. S., 57(3):743-750, Jan.-March 1967. 25 refs.

Patterns of RNA synthesis were studied in nuclei isolated from normal and regenerating liver. The base compositions of the RNA were measured by tracer techniques, and the sites of synthesis were determined by autoradiography. It is possible with isolated nuclei to alter both the base composition of the newly synthesized RNA and the sites of synthesis within the nucleus. An activation of genetic loci other than those associated with ribosomal RNA, which was the major type of RNA synthesized, can be obtained by exposing the nuclei to Mn(2+) ions and salts. These changes can be effected at very low salt concentrations that do not disrupt nuclear structure. The selective activation of extranucleolar synthesizing sites has been verified by electron microscope autoradiography. (Author summary modified)

4285 APTIC NUMBER 13792

Politzer, Peter
A CHARGE-TRANSFER INTERPRETATION OF THE INTERACTIONS OF HEMOGLOBIN WITH OXYGEN AND CARBON MONOXIDE. Biochim. Biophys. Acta, 153(4):799-803, May 28, 1968. 13 refs.

It is shown that the use of the charge-transfer theory to describe the interaction between hemoglobin and O2 or CO leads to the prediction of a linear relationship between the logarithm of the equilibrium constant for the equilibrium reaction HbO2 plus CO yields HbCO plus O2 and the difference between the absorption wavelengths of HbO2 and HbCO. Such a linear relation was previously observed experimentally for a number of vertebrate hemoglobins but was never satisfactorily explained. The fact that the charge-transfer theory explains this seemingly unlikely relationship provides support for the view that the interaction between hemoglobin and O2 or CO is a charge-transfer process. (Author summary modified)

4286 APTIC NUMBER 13061

Poon, Calvin P. C.
VIABILITY OF LONG-STORAGED AIRBORNE BACTERIAL AEROSOLS. Proc. Am. Soc. Civil Engrs., J. Sanit. Engrg. Div., 94(SA6): 1137-1146, Dec. 1968. 8 refs.

The effects of storage time on the viability of airborne bacterial aerosols were investigated. It was found that an increase in the

air temperature will increase the death rate of the cells. A decrease in the relative humidity will also increase the death rate. The rate of water evaporation plays an important role in the viability of airborne cells, as in the case of instantaneous death of bacterial aerosols when a high rate of evaporation occurred. Chemical additives associated with bacterial aerosols influence the water evaporation rate and, therefore, the death rate. It was found that all chemicals reduce the death rate to a certain extent. This is a result of a decrease in water evaporation due to a drying chemical layer formed around the aerosol during the process of evaporation. Sewage treatment plants should be considered a potential health hazard because bacterial aerosols from these plants can survive for long periods of time in the presence of chemical additives. (Author conclusions modified)

4247 APTIC NUMBER 13582

Pope, C. G.
FLOW OF SULPHUR DIOXIDE OVER THE SURFACE OF SPHERON 6(2700) GRAPHITIZED CARBON BLACK. Trans. Faraday Soc., 63(3):738-742, 1967.

The major objective of this work was to determine whether the flux of adsorbed molecules could be described as a diffusion process, when the adsorbate concentration was high, and a concentration gradient existed across the barrier. This was achieved by comparing apparent surface diffusion coefficients obtained under these conditions with the results of true diffusion experiments using radioactive sulfur dioxide as a tracer. The true diffusion process increased in importance as the surface concentration decreased, and, where the adsorbent particles were relatively large and had a nearly homogeneous surface could be easily interpreted. The tracer experiments gave results which were consistent with the adsorbate behaving like a two-dimensional gas at low surface coverages.

4248 APTIC NUMBER 13823

Pozin, M. Ye., V. V. Zubov, L. Ya. Tereshchenko, E. Ya. Tarat, and Yu. L. Ponomarev
SOLUBILITY OF NITRIC OXIDE IN WATER SOLUTIONS OF CERTAIN SALTS. (Rastvorimost' okisi azota v vodnykh rastvorakh nekotorykh soley). Text in Russian. Izv. Vysshikh Uchebn. Zavedenii, Khim. i Khim. Tekhnol., 6(4):608-616, 1963. 16 refs.

Statistical methods were applied to new experimental data on the solubility of NO in water solutions of CuSO4, CuCl2, MnSO4, H3PO4, CoSO4, NiSO4, Cu2(NH3)nCl2, Na2SO3, FeSO4, and FeCl2. Maximum NO solubility under absorption conditions was exhibited by Na2SO3, FeSO4, and FeCl2 solutions and ammonia solutions of monovalent copper, the process of NO absorption being reversible in all cases except with sodium sulfate. Solutions of divalent iron salts and of sodium sulfate are seen as industrially important NO absorbers. Equilibrium of the NO - iron salt solution system at salt concentrations up to 20-30% was studied for the temperature range of 10-90 C. An approximation formula for determining the equilibrium constant for salt concentrations greater than 0.7 g-mole/liter is presented. Nomograms for determining the NO equilibrium pressure in FeCl2 and FeSO4 solutions are plotted.

4249 APTIC NUMBER 13678

Prahacs, Steven
PYROLYTIC GASIFICATION OF NA-, CA-, AND MG-BASE SPENT PULPING LIQUORS IN AN AST REACTOR. In: Fuel Gasification, Advances in Chemistry Series 69, American Chemical Society, Washington, D. C., Div. of Cellulose Wood, 1967, p. 230-252. 12 refs.

Pyrolytic gasification of concentrated spent Na-, Ca-, and Mg-base pulping liquors to recover pulping chemicals and heat was carried out in an Atomized Suspension Technique (AST) reactor at 600 to 900 C and 5 to 45 psig in an experimental evaluation of the method. Crude ammonia and methanol synthesis gases and some unsaturated hydrocarbons can be produced by AST pyrolysis of these liquors within a certain range of operating conditions. The Na-base liquor gave the highest yield of synthesis gas, and the Mg-base liquor gave the highest yield of unsaturated hydrocarbons under indentical conditions. The effect of the base on the kinetics of the gasification is discussed. (Author abstract modified)

4250 APTIC NUMBER 13276

Prescott, J. M. and Stella M. Wilkes
AEROMONAS AMINOPEPTIDASE: PURIFICATION AND SOME GENERAL PROPERTIES. Arch. Biochem. Biophys., 117(2):328-336, Nov. 1966. 22 refs.

An aminopeptidase was purified from culture filtrates of the marine bacterium Aeromonas proteolytica. The stability of the aminopeptidase at 70 deg permitted the use of a heat treatment to inactivate a proteinase from which the aminopeptidase was otherwise difficult to separate. Purification of the aminopeptidase from heat-treated culture filtrate was accomplished by chromatography on DEAE-cellulose and gel filtration on Sephadex G-75. Moving-boundary electrophoresis, ultracentrifugation, and substrate specificity studies indicated a high degree of homogeneity for the preparations. The enzyme hydrolyzed a number of peptides, amino acid amides, and amino acid beta-naphthylamides. It was specific for substrates having a free alpha-amino group on a residue of the L-configuration; the nature of the amino acid in the N-terminus exerted a considerable effect on hydrolytic rates. The aminopeptidase, as isolated, did not require the addition of activating ions, but was strongly inhibited by ethylenediaminetetraacetate (EDTA). Addition of Zn(2+) or Co(2+) to the EDTA-inhibited enzyme restored activity to the original level; Mn(2+) was partially effective, and Mg(2+), Ca(2+), and Ni(2+) were ineffective. Analysis of several individual preparations revealed the presence of zinc in the aminopeptidase. A molecular weight of 29,500 was calculated from

measurements of sedimentation velocity and diffusion. (Author abstract modified)

4251

APTIC NUMBER 13272

Quimby, George R. and Otto Goldschmid
RECOVERY OF LIGNOSULFONATES FROM SPENT SULFITE LIQUORS.
(Rayonier Inc., Shelton, Wash.) U. S. Pat. 3,271,382. 4p., Sept. 6, 1966. 3 refs. (Appl. Sept. 26, 1963, 2 claims).

Sufficient quaternary ammonium salt is dissolved in water and added to the spent sulfite cooking liquor at ambient temperature to provide about a stoichiometric ratio of quaternary ammonium salt to lignosulfonate and the mixture is agitated. The concentration of total solids dissolved in the spent sulfite cooking liquor is not critical and can range from about 1 to 50%. The lignosulfonate and quaternary ammonium salt combine to form a dense flocculant which settles within a minute or two after agitation is stopped, leaving the wood sugars and other impurities in solution. The excess solution is then decanted or siphoned off and the precipitated quaternary ammonium lignosulfonate is recovered by filtration or centrifuging, after which it is washed free of impurities with cold water. The washed precipitate is dissolved in an aliphatic alcohol (preferably methanol or 95% ethanol) for separation of quaternary ammonium salt lignosulfonate components and their recovery in pure form. The lignosulfonate is precipitated from the alcoholic solution by the addition of a slight excess of an alcoholic solution of a soluble alkali metal hydroxide or neutral salt, such as NaOH, KOH, NaCl or KCl. The alkali metal lignosulfonate immediately precipitates out in a dense, rapidly settling form and can be easily separated and recovered as a pure material.

4252

APTIC NUMBER 13286

Rafter, Gale W.
FURTHER STUDIES ON THE ACID-LABILE BOUND PHOSPHOSERINE OF ESCHERICHIA COLI. Arch. Biochem. Biophys., 122(3):648-652, Dec. 1967. 8 refs.

Phosphoserine anhydride was identified in acid hydrolyzates of crude ammonium sulfate fractions prepared from Escherichia coli and in the acid-soluble material obtained by incubating E. coli fractions in alkaline pH buffer solutions. Pretreatment of fractions with ethylenediaminetetraacetic acid (EDTA) inhibited the latter reaction, and addition of Mn(2+) and certain other divalent cations to EDTA-treated fractions restored the release process. Besides phosphoserine anhydride, phosphoserine was found as a product of the degradation of E. coli bound phosphoserine by either acid hydrolysis or by incubating fractions. In both types of hydrolyzates, about 45% of the phosphoamino acid was found as phosphoserine and about 55% as phosphoserine anhydride. These findings support the investigator's earlier proposal that E. coli acid-labile bound phosphoserine is attached to an acid-insoluble carrier through an ester link. Presumably, the carrier brings together two molecules of amino acid for anhydride formation. (Author abstract modified)

4253

APTIC NUMBER 13365

Ramakrishna, T. V., Philip W. West, and J. W. Robinson
THE DETERMINATION OF MOLYBDENUM BY ATOMIC ABSORPTION SPECTROSCOPY. Anal. Chim. Acta, vol. 44:437-439, 1969. 6 refs.

The effect of various ions on the determination of molybdenum in aqueous samples was investigated. A simple and rapid procedure to overcome the interferences is proposed. Results of the experiments showed that most ions interfered with the determinations. The concentration of molybdenum was held at 20 ppm and the interferent was held to a concentration of 200 ppm. The effect of acids was examined by adding 5 ml of the appropriate acid to the solution followed by dilution to 100 ml with distilled water. Both perchloric and acetic acids enhanced absorption by about 30%, whereas sulfuric acid interfered by reducing the sensitivity by about 25%. Hydrochloric and nitric acids show little effect on molybdenum absorption. The effect of various ions on molybdenum absorption in the presence of a refractory metal ion was studied. Fifty ppm of Al was found to produce maximum enhancement of molybdenum absorption. The sensitivities in the absence and presence of Al were respectively 1 ppm and 0.8 ppm of molybdenum for 1% absorption.

4254

APTIC NUMBER 13443

Rapson, W. H., M. Wayman, and C. B. Anderson
PAPER BLEACHING-A NEW PROCESS. Tappi, 48(2):65-72, Feb. 1965. 6 refs.

Procedures were developed for increasing brightness in paper by bleaching with peracetic acid, peroxide, and sodium or zinc hydrosulfite. A two-stage bleach in which peracetic acid was followed by zinc hydrosulfite was most effective. Bleaching time was extremely short, 1 or 2 min with the peroxide, and 5-30 sec with the other bleaching agents. A variety of papers were bleached by these processes. The brightness of commercial sulfite-groundwood papers such as newsprint, rotonews, and directory was raised about 10 to 11 units by 1% of peracetic acid on paper, 8 to 11 units by 1% of zinc hydrosulfite on paper, and 12 to 15 units by the two-stage process using 1% of each of these chemicals. The bleached papers had brightness of 72 to 76. Peroxide bleaching of these papers was less effective, the brightness being improved by 4 to 8 units. The towsidedness of newsprint was markedly reduced. However, the opacity became much lower, falling from 0.954 to 0.900, a level too low to be acceptable for newsprint. Laboratory papers containing refiner groundwood, high yield sulfite or unbleached kraft were also studied, and improvements in brightness were obtained. Laboratory newsprint papers using unbleached kraft were bleached to acceptable newsprint brightness. The conditions employed in these bleaches are such that they should be adaptable for on-machine operation. (Author abstract modified)

4255 APTIC NUMBER 13671

Nazumovskii, S. D., A. L. Buchachenko, A. B. Shapiro, E. G. Rozantsev, and G. E. Zaikov
THE FORMATION OF NITROXYL RADICALS IN THE REACTION OF AMINES WITH OZONE. Dokl. Chem., Proc. Acad. Sci. USSR (English Transl.), 183(4-6):1086-1089, Dec. 1968. 9 refs.

It was shown experimentally that nitroxyl radicals are intermediate products in the reaction of ozone with secondary amines. The radicals were identified by electron spin resonance and thin-layer chromatography. The radicals were capable of further reacting with ozone, whereupon they were converted to non-radical products which did not react with ozone. The kinetics of the accumulation and consumption of nitroxyl radicals and the content of ozone in the effluent gas from the reactor during the interaction of N-phenyl-N-isopropyl-p-phenylenediamine were studied. Other amines studied were diphenylamine and derivatives of oxopiperidine, hydroxypiperidine butylaniline, and quinoline. It was found that the accumulation of nitroxyl radicals begins in the early stages of ozonation, at which point the rate is maximum. The reaction showed a low activation energy. The reaction mechanism is given in a scheme, based on the experimental results. It was concluded that the first stage of the reaction is formation of the nitroxyl radical, the concentration of which depends on the ratio of the rates of its formation and consumption. In some cases, a quantitative yield of the radical with respect to the amine can be obtained. The previously proposed reaction scheme should be modified to include stages in which nitroxyl radicals are formed and destroyed.

4256 APTIC NUMBER 13001

Bedding, Ralph A., Charles T. Hauck, Joseph M. Stein, and Byron Stein
NEW ACTIVITY ON LUNG SURFACTANT. New Engl. J. Med., 280(23):1298-1299, June 5, 1969. 5 refs.

Deficiency or inactivation of lung surfactant has been implicated as a part of the pathophysiology of many diseases. The chemical nature of surfactant, generally considered to be a lipoprotein, has not been clearly established. A surface-active agent has been isolated from both canine and rat alveolar washings by centrifugation in an aqueous medium. The material satisfies all the criteria for lung surfactant but contains only lipids, predominantly phospholipids. No surface-active lipoproteins were found. Electron microscopy of lung tissue is consistent with these conclusions. It has been found that a spectrum of fatty acid chain lengths and some unsaturation are necessary to produce the observed behavior of lung surfactant at body temperature. Analyses of fatty acids of the isolated canine phospholipids fulfill these requirements. Since neither protein nor polysaccharides appear to be necessary for surface activity, it may be possible to administer synthetic materials to patients with deficient or inactivated surfactant without danger of immunological complications.

4257 APTIC NUMBER 13278

Rehwoldt, R. F., R. L. Chasen, and J. B. Li
2-CHLORO-5-CYANO-3,6-DIHYDROXYBENZOQUINONE, A NEW ANALYTICAL REAGENT FOR THE SPECTROPHOTOMETRIC DETERMINATION OF CALCIUM (II). Anal Chem., 38(8):1018-1019, July 1966. 8 refs.

A new analytical reagent, 2-chloro-5-cyano-3,6-dihydroxybenzoquinone (HDDQ), for the spectrophotometric determination of calcium is described. The reagent is the product of the decomposition of 2,3-dichloro-5,6-dicyanobenzoquinone (DDQ) by water. Its disodium salt was prepared from DDQ. Experiments to study the nature of disodium HDDQ solution and complexes revealed that dilutions of the solutions followed Beer's Law, and that the precipitations varied in color and structure. A series of disodium HDDQ and $Ca(NO_3)_2$ solutions were prepared and a linear plot was obtained for the calibration curve for the HDDQ supernatant solutions of the Ca complex. The sensitivity of the determination was found to decrease when the pH was less than four. Spectrophotometric analyses were performed on several aquaria water samples.

4258 APTIC NUMBER 13401

Reid, W. T. and P. Cohen
FACTORS AFFECTING THE THICKNESS OF COAL-ASH SLAG ON FURNACE-WALL TUBES. Trans. ASME (Am. Soc. Mech. Engrs.), 66:685-690, Nov. 1944. 9 refs.

An equation is given relating thickness of slag deposit to slag flow properties, of the temperature of hot and cold sides of the deposit, and the volume of slag flow. The relative thickness of slag deposits for typical conditions can be calculated from this equation, providing a method of comparing the behavior of different coal ashes on furnace walls. For fixed furnace conditions, increase in the viscosity of the slag cause equal increases in the thickness of slag deposit. As the temperature of critical viscosity approaches the temperature of the furnace side of the slag deposit, there is a large increase in the thickness for all viscosities. For a fixed temperature of critical viscosity, there is an equal decrease in the thickness of the deposit for all viscosities as the temperature of the furnace side of the slag deposit is increased. The relationship between slag composition and relative thickness of deposit is shown for part of the field of composition of coal-ash slags. Increase in equivalent Fe_2O_3 content and decrease in ferric percentage, decrease the thickness of the deposit; CaO also decreases the deposit thickness as its content increases, the effect being greatest with slags containing less than 20% equivalent Fe_2O_3. (Author summary modified)

4259 APTIC NUMBER 13883

Reiman, Clarence K. and Annie S. Minot
A METHOD FOR MANGANESE QUANTITATION IN BIOLOGICAL MATERIAL TOGETHER WITH DATA ON THE MANGANESE CONTENT OF HUMAN BLOOD AND TISSUES. J. Biol. Chem., vol. 42:329-345, 1920. 11 refs.

A method was developed for the analysis of manganese in blood and tissue which is more rapid and has fewer sources of error than methods employed previously. Results of manganese determination in human blood are given. Samples were taken from normal subjects with respect to manganese exposure, although some of the individuals were pathological cases. A number of check results on the same individuals taken at different times show the general constant level of manganese in the blood. A series of results for the manganese content of human tissue obtained from fourteen autopsies is presented. Manganese was found in all tissue analyses. The liver carried the highest amount, averaging 0.17 mg/100 gm of wet tissue.

4260 APTIC NUMBER 13876

Remy, H. and W. Hene
ADSORPTION OF GASES BY ACTIVE CHARCOAL. (Ueber die Adsorption von Gasen durch aktive Kohle). Text in German. Kolloid - Z. (Germany), 61(3):313-322, Dec. 1932. 12 refs.

The adsorbability of a number of gases by a highly active charcoal was studied. A simple relationship was found to exist between the adsorbabilities at 15 C and the vapor pressures of the liquefied gases at 15 C. The dependence on pressure of adsorption at room temperature (15 C) of the gases H2, O2, N2, N2O, CO2, SO2, and CH3Cl was investigated as was the dependence on temperature of the adsorption at atmospheric pressure of the gases H2, CO2, SO2, NH3, and CH4. An empirical formula was derived which jointly represents the adsorbabilities of the latter gases at those temperatures at which their vapor pressures are equal. A few exploratory experiments were carried out on the adsorption of gas mixtures by charcoal. It was discovered that with any of the several gas mixtures used, the total amount adsorbed was not related simply to the sum of adsorbabilities of its individual components. However, this amount corresponded approximately to the mean value of the adsorbabilities of the individual components of the mixture.

4261 APTIC NUMBER 13277

Reusser, Fritz
INTERACTIONS OF DIVALENT AND TRIVALENT CATIONS WITH ANTIBIOTIC U-20,661, A DNA BINDING AGENT. Arch. Biochem. Biophys., 121(2): 399-403, Aug. 1967. 6 refs.

This paper describes interactions of antibiotic U-20,661 and antibiotic-DNA complexes with di- and trivalent cations. The absorption maximum of U-20,661 undergoes a bathochromic shift from 440 millimicrons in acid solution to 530 millimicrons in strong basic solutions, suggesting that the compound is a weak acid which undergoes ionization at an elevated pH. The divalent cations Mg(2+), Mn(2+), Cu(2+), Co(2+), and Ca(2+) induced an identical bathochromic shift in the absorption spectrum of U-20,661 from 440 to 530 millimicrons at neutral pH in aqueous solutions. An isosbestic point was apparent at 475 millimicrons. The monovalent cations Na(+) and K(+) did not cause such changes. The trivalent cations Fe(3+) and Al(3+) caused complex spectral changes in the ultraviolet and visible spectrum of U-20,661 which differed from each other and from the changes observed with divalent cations. The extent of the binding capacity of the antibiotic to DNA remained unaffected by the presence of di- or trivalent cations. (Author abstract modified)

4262 APTIC NUMBER 13640

Reysig, W. A., S. A. Stadnik, and G. M. Shchegolev
HIGH-TEMPERATURE FIXATION OF NITROGEN OXIDES. (K voprosu o vysokotemperaturnoy fiksatsii okislov azota). Text in Russian. Khim. Vysokikh Energiy, 1(6):587-591, 1967. 12 refs.

Results of numerical solution to a system of kinetic equations describing the change in state of dissociated air as a function of change in temperature and cooling rate are presented. These results are in good agreement with experiments. A method is given for obtaining from calculated data a law of cooling for NO-containing dissociated gases (especially air) which assures maximum hardening (irreversible freezing of reacting gas composition) of nitrogen oxides. The effectiveness of using the slot heat exchanger in plasmochemical processes is demonstrated.

4263 APTIC NUMBER 13084

Richardson, F. D. and J. H. E. Jeffes
THE THERMODYNAMICS OF SUBSTANCES OF INTEREST IN IRON AND STEEL MAKING. III. SULPHIDES. J. Iron Steel Inst. (London), vol. 171:165-175, June 1952. 66 refs.

A survey was made of available data on the thermodynamics of sulfides and gaseous sulfur compounds of interest in iron and steel making. The results are plotted on free energy vs temperature diagrams, and equations and likely accuracies are quoted for each substance. One free energy diagram includes those gaseous sulfides of interest in furnace or laboratory investigations. The metal sulfide free energy diagram includes a number of metals which are not of direct interest in iron and steel making, such as platinum, iridium, and molybdenum, because their behavior limits their use as containers and heating elements in laboratory investigations in sulfide systems. The non-stoichiometry of metal sulfides is discussed.

4264 APTIC NUMBER 13379

Rioux, J. P. and P. G. Fortubise
DETERMINATION OF CHLORIDE IONS IN PULP AND PAPER. COMBINATION

OF OXYGEN FLASK AND AUTOMATIC POTENTIOMETRIC TITRATION TECHNIQUES. Tappi, 48(1):11-14, Jan. 1965. 9 refs. (Presented at the 15th Testing Conference, Tech. Assoc. of the Pulp and Paper Industry, Boston, Sept. 29-Oct. 1, 1964).

A rapid and precise method for the potentiometric titration of chloride ions in pulp has been developed. The pulp is ashed by the oxygen flask technique. The chloride ions are absorbed in dilute sodium hydroxide, the solution is evaporated to dryness, and the residue is redissolved in a small amount of dilute nitric acid. The solution is diluted with acetone and titrated with 0.0025M silver nitrate using a potentiometric titrator-recorder, and an Ag-AgCl-glass electrode system. Procedures for total chloride and water soluble chloride are described. The procedure for total chloride was applied to water and methanol-benzene extracted pulps to determine the lignin-bound chlorine, the resin-bound chlorine being calculated by difference. The method was examined for recovery and reproducibility. The range is 5 to 1000 ppm on pulp. A total chloride determination (including ashing) can be performed in 30 min. (Author abstract)

4265 APTIC NUMBER 13944

Ripley, D. L. and W. C. Gardiner, Jr.
CHEMICAL KINETICS OF THE SHOCK-INITIATED COMBUSTION OF HYDROGEN AT LOW TEMPERATURES AND HIGH PRESSURES. Preprint, The Combustion Inst., Pittsburgh, 28p., 1967. 21 refs. (Presented at the Western States Section Meeting, The Combustion Inst., Seattle, Wash., Oct. 30-31, 1967, Paper WSCI-67-28.)

The ignition mechanism of the hydrogen-oxygen explosion at temperatures near 1000 K and pressures greater than one atmosphere was investigated theoretically, using the complete analytic solution to the kinetic equations of an abbreviated, linearized mechanism and numerical integration of the full conventional mechanism for these conditions. It was found that the analytical solution is capable of only a qualitative description of the second limit effect observed in reflected shock experiments on ignition delays, and cannot be forced to yield quantitative agreement. The numerical integration can be forced to give quantitative agreement, but only at the cost of accepting rate constant expressions which do not allow quantitative description of the simpler ignition phenomena at higher temperatures and lower pressures. Gasdynamic effects apparently play a major role in the ignition phenomenon at low temperatures and high pressures. An exception to these conclusions is the use of analytic expressions for interpretation of branching rates early in the induction zone, which appears to be valid within wide limits. (Author abstract modified)

4266 APTIC NUMBER 13897

Rodionov, A. I., Yu. S. Mishchenko, A. P. Klimov, and E. A. Bogdanov
ABSORPTION OF NITROGEN OXIDES BY LIMESTONE SUSPENSION. (Absorbtsiya okislov azota suspenziyey izvestnyaka). Text in Russian. Tr. Mosk. Khim. Tekhnol. Inst., vol. 40:74-77, 1963. 6 refs.

Absorption of nitrogen oxides by a limestone suspension containing 10-110 g/liter CaCO3 was studied in a [illegible]ate bubbling column. The following was observed: [illegible]ase in degree of oxidation of the gas from 0.32 to [illegible]reases the degree of absorption from 42-45 to 62-65%; th[illegible]ee of absorption increases with increased concentration o[illegible]itrogen oxides; the degree of absorption is independent of Ca[illegible] content, but the height of the foamy layer decreases, reducing the resistance of the plate; the degree of NO plus NO2 absorption remains the same when the temperature of the foamy layer is increased from 16 to 58 C.

4267 APTIC NUMBER 13905

Rodkey, F. Lee, John D. O'Neal, and Harold A. Collison
OXYGEN AND CARBON MONOXIDE EQUILIBRIA OF HUMAN ADULT HEMOGLOBIN AT ATMOSPHERIC AND ELEVATED PRESSURE. Blood, 33(1):57-65, Jan. 1969. 19 refs.

Investigations were designed to examine the effects of inert gases, pressure, temperature, and pH on the equilibrium constant (K) between oxygen and carbon monoxide in hemoglobin. Results showed adult human hemoglobin had an affinity for carbon monoxide 218 times that for oxygen at 37 C, and the relative affinity constant K was increased by 2% with a decrease in temperature of 1 C. There was no change in the relative affinity between pH 6.8 and 8.8, and the same value was obtained with whole blood and with concentrated undialyzed hemoglobin solutions. Measurements made at atmospheric pressure were identical with absolute. Substitution of helium for nitrogen as inert gas did not alter the value. (Author summary modified)

4268 APTIC NUMBER 13368

Rosazza, John P., William J. Kelleher, and Arthur E. Schwarting
PRODUCTION OF LYSERGIC ACID DERIVATIVES IN SUBMERGED CULTURE. IV. INORGANIC NUTRITION STUDIES WITH CLAVICEPS PASPALI. Appl. Microbiol., 15(6):1270-1283, Nov. 1967. 43 refs.

The inorganic requirements for growth and alkaloid production by submerged cultures of a lysergic acid alkaloid-producing isolate of Claviceps paspali were determined in a defined medium. The requirement for peak growth was essentially the same as the requirement for maximal alkaloid production in the case of potassium and magnesium. With phosphorus, however, maximal growth was reached at lower levels than those required for maximal alkaloid production. Sulfur was required in smaller amounts for peak alkaloid production than for maximal growth. In the case of iron and zinc, the requirement for maximal alkaloid production was greater than for growth. Manganese and copper could be sufficiently depleted to demonstrate their essentiality for alkaloid production, but their requirements for growth could not be demonstrated. (Author abstract)

4269 APTIC NUMBER 13045

Rosenberg, Edith
ANALYSIS OF THE PROPERTIES OF PULMONARY SURFACTANT USING MODIFIED WILHELMY BALANCES. Resp. Physiol., 7(1):72-87, June 1969. 13 refs.

In order to establish an objective criterion for identifying pulmonary surfactant on modified Wilhelmy balances the areas corresponding to the lowest recorded minimum surface tension were measured and expressed in dyne-minutes on a Wilson (W) and an Electronic (E) balance. Fresh and lyophilized tracheal lavage from healthy dogs and rats was used as test material. Whenever sufficient material was available from rat lungs comparable areas approximately 250 dyne-minutes were obtained. The areas from dog lung lavage were always significantly higher even though the surface tension (γ) minima for dog and rat lungs were comparable. Minimum γ on the W balance was always lower for fresh lavage on the E balance. Minimum γ depended on the quantity of surfactant used regardless of its source and was closely correlated (corr. coeff. approx. 0.9) to Clements' s bar i.e., s bar is not an independent measure of the quality of pulmonary surfactant. Lyophilization did not appear to change the quality of surfactant (areas of loops) but did produce a quantitative loss. (Author abstract modified)

4270 APTIC NUMBER 13510

Rosenqvist, T. and P. H. Hynne
ON THE REACTION BETWEEN IRON SULPHIDE AND SULPHUR DIOXIDE. Tidsskr. Kjemi, Bergvesen Met., 13(9):196-200, 1953. 1 ref.

Thermodynamics of the reaction: $3FeS + 2SO2 = Fe3O4 + (5/2)\ S2$ were studied because this reaction could be a way to convert iron sulfide ores into elementary sulfur and an iron oxide suitable for pig iron production. On the basis of the thermodynamic data, it is shown that this reaction is indeed the reaction taking place in the temperature range of 500 to 1000 C. Melting relations in the system FeS - Fe3O4, the eutectic point and X-ray studies are also presented.

4271 APTIC NUMBER 13781

Ross, L. W.
THERMODYNAMICS OF SULPHUR DIOXIDE CONVERSION TO SULPHUR TRIOXIDE. Sulphur, no. 65:37, Aug./Sept. 1966. 4 refs.

The heat, free energy, and equilibrium constant for the conversion of sulfur dioxide to sulfur trioxide were computed and given in a table. Sulfur trioxide data were obtained by computations based on the experimental frequency assignments of Lovejoy, et al. Data on sulfur dioxide and oxygen were obtained from the JANAF tables. The values computed at intervals of 100 K were fitted to an orthogonal polynomial interpolation function of degree eight and recomputed at 25 K intervals. The results differed from those of previous investigations by nearly 20% for some values of the equilibrium constant, although agreement was good in the region of importance.

4272 APTIC NUMBER 13335

Ross, Sydney and G. J. Young
ACTION OF ANTIFOAMING AGENTS AT OPTIMUM CONCENTRATIONS. Ind. Eng. Chem., 43(11):2520-2525, Nov. 1951. 13 refs. (Presented before the Div. of Colloid Chemistry at the 118th Meeting of the Am. Chem. Soc., Chicago).

The mechanism underlying the action of foam-inhibiting agents was investigated. The selection of systems for study was based on the requirement that they provide copious and stable foam; the foaming test was one that required a quantity of foam still produced despite the presence of the antifoaming agent. For a comparison of the effects of different agents, it was necessary to find the optimum concentration of each. On this basis the antifoaming effect was compared with the viscosity, the spreading coefficients, and the entering coefficients of each agent for each of the two aqueous foaming solutions containing surface-active agents. The sign of the spreading and entering coefficients is usually positive for a foam-inhibiting agent. No precise correlation exists between the magnitudes of the properties reported, though a large positive spreading coefficient and a low viscosity are usually associated with more effective antifoaming action. Two distinct effects of foam inhibitors could be distinguished. With some, the agent promotes the drainage rate of liquid from the foam films without affecting the final thickness of the film at which rupture takes place. This effect appears to be the result of decreased surface viscosity produced the the presence of the agent. Other agents cause the rupture of thick liquid films before drainage of the liquid has thinned them to the breaking point. Methylisobutylcarbinol and tributyl phosphate embody extremes of the two possible types of effects. Other agents produce combinations of the two effects. (Author abstract modified)

4273 APTIC NUMBER 13895

Rozlovskiy, A. I.
KINETICS AND MECHANISM OF NITRIC OXIDE DISSOCIATION. (Kinetika i mekhanizm razlozheniya okisi azota). Text in Russian. Zh. Fiz. Khim., 30(6):1349-1355, 1956. 15 refs.

Dissociation of nitric oxide is catalyzed in the presence of oxygen in amounts commensurate with NO content. An equation describing the reaction kinetics for any oxygen content is presented, observed regularities being subject to the formation of reaction chains. Initial reaction centers arise through equilibrium dissociation of oxygen at the reaction walls. Over a wide range of experimental conditions, the reaction proceeds with simultaneous chain and bimolecular mechanisms. Observations indicate a constant rate for the bimolecular reaction. These findings contradict those of other Soviet authors requiring a retardation of NO dissociation by oxygen. This contradiction

is seen as stemming from an erroneous assumption regarding the ratio of reaction constants for N plus O2 and N plus NO, there being no possible assumption regarding the rate-determining stage which will lead to the need for retardation of the chain reaction by oxygen. A quantitative explanation of explosion experiments with excess oxygen and a qualitative explanation with excess fuel are thus made possible.

4274 APTIC NUMBER 13476

Runolinna, Urmas
DRY MAGNETIC SEPARATION OF FINELY GROUND MAGNETITE IN A ROTATING MAGNETIC FIELD. Acta Polytech. Scand. Chem. Met. Ser., No. 23, 74p., 1961. 22 refs.

The behavior of magnetite particles in a rotating magnetic field was investigated by measurement of the velocity of the magnetite clusters, and by photography of their tumbling movement at different field frequencies up to 500 cps. The main factors effective in a dry separation process were investigated by the employment of the Mortsell-Sala, Laurila, and Cavanaugh separators. The results of the separation tests are theoretically explained, and the optimum conditions for dry separation in a rotating magnetic field are discussed. The desired field frequency is 65-75 cps. The construction of dry separators used for the tests is analyzed.

4275 APTIC NUMBER 13839

Sachdev, Sham L. and Philip W. West
CONCENTRATION AND DETERMINATION OF TRACES OF METAL IONS. Anal. Chim. Acta, 44:301-307, 1969. 9 refs.

A procedure is presented for the preconcentration and simultaneous determination of Ag(I), Cd(II), Co(II), Cu(II), Ni(II), Pb(II), and Zn(II). The conditions for the extraction of these metal ions with diphenylthiocarbazone (dithizone) in ethyl propionate, along with atomic absorption spectrophotometry procedures, are described. The metal dithizonates are very stable in ethyl propionate, and the chelate-solvent system enhances the sensitivity for the atomic absorption method used for the determination. For the determination of the metals in question, an oxidizing flame provides better conditions than a reducing flame. The desirable aspiration rate of 3 ml/min is easily achieved by attaching a polyethylene capillary tube of 0.0015 in. inner diameter and 2.5 in. length to the capillary of the burner. With 10:1 aqueous-organic solvent ratios, the sensitivities for 1% absorption of the signal range from 0.001 micrograms for Cd(II) and Zn(II) to 0.004 micrograms for Pb(II). Among 38 diverse ions and compounds whose interference effects were studied, only silicate, tellurite, tin (IV), and antimony (III) are incompatible with this extraction system. (Author summary modified)

4276 APTIC NUMBER 13314

Sachdev, Sham L., J. W. Robinson, and Philip W. West
DETERMINATION OF MANGANESE, IRON, COBALT, AND NICKEL IN AIR AND WATER BY ATOMIC ABSORPTION SPECTROSCOPY. Anal Chim. Acta, 38(4):499-506, April 1967. 10 refs.

Flames of 4 different kinds and of various compositions were studied for their suitability for atomic absorption spectroscopy for the determination of manganese, iron, cobalt, and nickel. The effects of various other factors such as lamp current, slit-width, and position of the burner were also investigated. Interference effects of a large number of ions and compounds were studied. Very few ions were found to interfere and means of eliminating the interferences noted are described. As a result of the investigation, sensitive and selective procedures for the determination of manganese, iron, cobalt, and nickel are reported. Sensitivities are Mn, 0.01 ug/l; Fe, 0.05 ug/l; Co, 0.03 ug/l and Ni, 0.02 ug/l for 1% absorption. All experimental data is tabulated. (Author summary modified)

4277 APTIC NUMBER 13565

Sanderson, R. T.
MULTIPLE AND SINGLE BOND ENERGIES IN INORGANIC MOLECULES. J. Inorg. Nucl. Chem., 30(2):375-393, Feb. 1968. 7 refs.

The new method of calculating bond energies recently reported (R. T. Sanderson, J. Inorg. Nucl. Chem., vol. 28:1553, 1966) has now been extended to include multiple bonds. For carbon-carbon double and triple bonds the energy is 1.50 and 1.75 times the single bond energy when corrected for the multiple bond length. These multiplicity factors are used to calculate the single bond energies for nitrogen and oxygen that would correspond to the experimental bond lengths and dissociation energies of N2 and O2. Three different single bond energy contributions each for nitrogen and oxygen are thus determined, and estimates are made for similar values for fluorine, phosphorus, sulfur, chlorine, bromine, and iodine. The possible significance of such values is discussed in terms of bond energy calculations for 141 gaseous molecules, based on a consideration of the effect of lone pair electrons in bond weakening. Calculated bond energies for CO, CO2, NO, NO2, and other compounds are in excellent agreement with the experimental values. (Author's abstract modified)

4278 APTIC NUMBER 13690

Schacksann, H.
EXAMPLES OF RECENT DEVELOPMENTS IN METALLURGY DUE TO CHEMICAL RESEARCH. (Beispiele neuer Entwicklungen der Huttenkunde auf Grund chemischer Forschung). Text in German. Chem. Ing. Tech., 26(2):65-72, Feb. 1954. 16 refs.

Although they are different fields, metallurgy and chemistry have close ties. Thus, a floatation process would not exist without the frother or accumulator developed by organic chemists. Nowadays about 80% to 96% of all copper, zinc, and lead ores are treated by floatation processes. Another process made possible by organic chemistry is the recovery of metal salts with ion exchangers. Experimental and theoretical chemistry helped in the

study of the roasting processes of sulfidic ores. The new improved Orkla-pyrite process aims at a better sulfur output while recovering the other valuable material. All metals can generally be produced by electrochemical and electrothermal reactions but for reasons of high costs, such processes are used solely when no simpler method will do. Gaseous and metallic reducing agents are used in metallurgy. Another example of the close relationship of metallurgy to chemistry is the amalgam process. Analytical chemistry also contributes its share. It helps not only to determine the composition of iron, but it also determines the form of binding of the impurities. It helps the metallurgist to analyze slag which accumulates in metallurgical processes, so that ways for a possible re-use can be found. These are just some examples of cooperation between the two fields.

4279 APTIC NUMBER 13879

Schenck, Rudolf and Agnes Albers
CHEMICAL EQUILIBRIA BETWEEN LEAD SULFIDE AND ITS ROASTING PRODUCTS. I. (Ueber die chemischen Gleichgewichte zwischen Bleisulfid und seinen Roestprodukten. I). Text in German. Z. Anorg. Allgem. Chem., vol. 105:145-166, 1918. 20 refs.

Measurements of reaction tensions associated with the reaction of lead sulfide with its oxidation products were repeated using calcium phosphate heating tubes to avoid errors occurring when silica vessels are used. At all measurable equilibria, lead sulfide is present in the condensed constituent. The nine possible tension curves were found and their mutual positions were determined. The most stable curves are those in which the metal phase, the sulfide, and an oxygen phase form the condensed constituent. Univariant equilibria, in which the metal phase coexists with two oxygen solid phases and a gaseous phase, could not be observed and they appear to be very labile. Reinders' explanations of the lead roasting reaction are incomplete and mostly incorrect. The gas atmosphere always contains, in addition to sulfur dioxide, lead sulfide vapor in measurable amounts, which must be taken into account. The set of the univariant equilibria of the system Pb-S-O can therefore be represented on by a three-dimensional diagram with the coordinates: temperature, gas pressure, and composition of the gas atmosphere, expressed in mole percent of lead-sulfide vapor. The mutual positions of the equilibrium tension curves in the case when, in addition to lead sulfide and one oxygenous solid phase, the condensed constituent includes a liquid lead oxide- lead sulfate melt, were considered in considerable detail. It was concluded that there exists a definite sequence of tension curves in the systems in which lead sulfide and two oxygenous phases form the condensed constituent. In this manner, a further means of identification of the observed reaction tension curves was obtained. Vapor pressures of lead sulfide, which can be rapidly distilled in vacuum at 900 C, were measured in the temperature interval between 650 and 1000 C.

4280 APTIC NUMBER 13866

Schmahl, Norbert G.
THE SYSTEM IRON-SULFUR-OXYGEN AND ITS SIGNIFICANCE AS A BASIS OF THE REACTIONS OF IRON SULFIDES WITH SULFUR DIOXIDE RESULTING IN IRON OXIDES AND SULFUR VAPOR. (Das System Eisen-Schwefel-Sauerstoff und seine Bedeutung als Grundlage der Umsetzungen von Eisensulfiden mit Schwefeldioxyd zu Eisenoxyden und Schwefeldampf). Text in German. Arch. Eisenhuettenw., 25(7-8):315-319, July-Aug. 1954. 29 refs.

In the Fe-S-O system, the stoichiometrically feasible reactions were determined by equilibrium considerations, and their domains of existence and equilibrium loci were established. These are given in tables and represented in isothermal graphs for the temperatures of 600, 700, 800, and 900 C. A new method of graphical representation of such ternary systems is described.

4281 APTIC NUMBER 13383

Schneider, Peter B. and Eugene P. Kennedy
SPHINGOMYELINASE IN NORMAL HUMAN SPLEENS AND IN SPLEENS FROM SUBJECTS WITH NIEMANN-PICK DISEASE. J. Lipid Res., vol. 8:202-209, 1967. 15 refs.

The purification and some of the properties of an enzyme from human spleen that catalyzes the hydrolysis of sphingomyelin with the formation of ceramide and phosphoryl choline are described. The enzyme, which is located in the subcellular particulate fraction that sediments between 700 and 8500 g, was readily made soluble and was partially purified. Its pH optimum is between 4.5 and 5.0. It is unaffected by divalent cations, chelating agents, and sulfhydryl reagents but is inhibited by phosphate. The enzyme attacks sphingomyelin and dihydrosphingomyelin, but is inactive toward sphingosine phosphoryl choline, O-acetylsphingomyelin, and lecithin. In some of its properties, the enzyme from human spleen is different from the previously studied sphingomyelinase from rat tissues. The enzyme is absent or markedly reduced in spleens from patients with classical and visceral varieties of Niemann-Pick disease but is present in normal amounts in the late infantile type of the disease. Another enzyme, which is magnesium-dependent and capable of catalyzing the cleavage of sphingomyelin was detected in the spleens of patients with the classical form of Niemann-Pick disease. Some implications of these findings for theories of the metabolic defect in Niemann-Pick disease are discussed. (Author abstract modified)

4282 APTIC NUMBER 13312

Schonfeld, E.
COMPUTER CALCULATED CONCENTRATIONS IN THE REACTIONS OF NITROGEN AND OXYGEN. J. Chem. Educ., 45(3):173-175, March 1968.

The efficiencies of the reaction of nitrogen and oxygen to form NO at high temperatures and the further oxidation of NO to NO2

at low temperatures can be calculated as a function of the initial gas composition, temperature, and pressure. Three computer programs were developed to perform all the computations. The first one computed equilibrium constants for all the reactions as a function of temperature. The input values to the program were the thermodynamic values that can be obtained from tables. The second and third computer programs solved the equilibrium concentrations of the high temperature reactions and low temperature reactions, respectively. These programs permitted the determination of the equilibrium yields of NO and NO2 as a function of temperature, pressure, and initial conditions (for any N/O atom ratio). The computer programs were written in Fortran.

4283 APTIC NUMBER 13384

Schoon, Nils-Herman
THE REACTION BETWEEN THIOSULPHATE AND WOOD DURING SULPHITE COOKING II. Svensk Papperstid. (Stockholm), 65(23):965-977, Dec. 15, 1962. 16 refs.

The formation of thiosulfate and organic excess sulfur and also the formation of sulfur via polythionates were calculated for a series of acid hydrogen sulfite cooks (1.0C, 1.36% Na20, 6% total-SO2, maximum temperature 135 and 148 C) with various amounts of thiosulfate added to the cooking acid. The calculations also included hydrogen sulfite cookings (1.92% Na20, 3.96% Na20% total-SO2, maximum temperature 155 C). In all cooks, thiosulfate was formed primarily from the reactions between aldoses and hydrogen sulfite. However, the formation of thiosulfate via the reactions between the polythionates and hydrogen sulfite (disproportionation of hydrogen sulfite) increased at the end of the acid hydrogen sulfite cook while formation via the aldoses and hydrogen sulfite decreased. When cooking acid contains thiosulfate, the thiosulfate concentration decreases rapidly. No corresponding increase in the polythionate concentration is observed at the beginning of these cooks, indicating a considerable formation of organic excess sulfur. The polythionate concentration increases rapidly in the final stage of the cooks due to the high hydrogen ion content. The high concentration suggests that polythionates are formed by other reactions in the presence of wood. In both paper pulp and rayon pulp cooks thiosulfate formation via aldoses and hydrogen sulfite also predominates. (Author abstract modified)

4284 APTIC NUMBER 13910

Schottky, Werner F. and Michael B. Bever
ON THE THERMODYNAMIC PROPERTIES OF THE III-V COMPOUNDS INSB, GASB, AND INAS. Acta Met., 6(5):320-326, May 1958. 21 refs.

The thermodynamic properties of compounds of elements from groups III and V were studied. The heats of formation of InSb, GaSb, and InAs at 0 C were measured by tin solution calorimetry. The heats of fusion of InSb and GaSb were measured by quantitative thermal analysis. From these measurements and published phase diagrams, the excess free energies of the liquid phases in the systems In-Sb and Ga-Sb and the free energies of formation of InSb and GaSb were calculated by Wagner's method. The excess free energies of the liquid phase indicated that they have essentially a metallic constitution. The calculated free energy of formation of InSb was compared with the value found from the heat and entropy of formation and satisfactory agreement was obtained.

4285 APTIC NUMBER 13706

Schroeder, Henry A., Joseph J. Balassa, and Isabel H. Tipton
ESSENTIAL TRACE METALS IN MAN: MANGANESE. A STUDY IN HOMEOSTASIS. J. Chronic Diseases, 19(5):545-571, 1966. 89 refs.

A survey of manganese concentrations in foliage, food, and tissues is presented. Trees concentrate Mn in leaves and twigs against an environmental gradient, and Mn is available to plants when soil pH is in the range of 4 to 6. Vegetables concentrate manganese in the germinal portion of grains and fruits and in nuts, as well as in leafy vegetables. Animal life demonstrates an ability to reject manganese taken in from the environment, and no manganese is accumulated. Human tissues from several countries all contained manganese in similar amounts regardless of location or age. Organ specificity was demonstrated for liver, kidney, intestine, and pancreas. The human lung did not accumulate manganese with age, in spite of appreciable concentrations in the air of industrial cities. The usual daily intake of manganese approximates 2 to 5 mg, or 10 to 25% of a total bodily pool of 20 mg, a ratio higher than that of any other caticnic trace metal. A small increment appears in the urine; the remainder is excreted by the liver and pancreas or is unabsorbed. Overt manganese deficiency has not been recognized in man. As measured by concentrations in liver, depletion is fairly uncommon. Excess accumulation of manganese occurs in a few human beings. Whether or not such excesses cause disease is not known. The theoretical existence of an inborn error of metabolism leading to accumulation of manganese in some organs is possible but has yet to be proven.

4286 APTIC NUMBER 13283

Seemann, Victor, ed.
SURVEYS OF COMMUNIST WORLD SCIENTIFIC AND TECHNICAL LITERATURE. SOME ASPECTS OF COMBUSTION KINETICS. ANALYTICAL SURVEY. Library of Congress, Aerospace Technology Division, Work Assignment No. 68, ATD M-65-100, 132p., Dec. 6, 1965. 93 refs.
CFSTI, AF 625832

A compilation of abstracts and translations of recent material pertaining to the kinetics of supersonic combustion and an analysis of the compiled data are presented. The detonation velocities of hydrogen and methane in shock waves were measured on the order of 2000 m/sec which is of comparable magnitude to the flow velocities encountered in supersonic-combustion flow. Good agreement occurs between the experimentally observed and

theoretically predicted values of the pressure ratio behind the detonation front. Experiments on the propagation of detonation in the tubes whose walls are coated with combustible liquids and greases may represent the utilization of a convenient model for the study of detonation phenomena in gas mixtures; the shock wave propagation rates indicated are high enough (1400 m/sec) to be commensurate with the high gas-flow rates through a standing detonation wave. Papers dealing with reflecting large-scale synthesis and application of organoaluminum compounds and the heats of combustion of triethylaluminum, diisobutylaluminum, and diethylaluminum are presented.

4287 APTIC NUMBER 13931

Seery, Daniel J. and Craig T. Bowman
A SHOCK TUBE STUDY OF METHANE OXIDATION. Preprint, Am. Chem. Soc., Washington, D. C., Div. Fuel Chem., 11(4):82-95, 1967. 11 refs.

An experimental study was made on the oxidation of methane behind reflected shock waves to provide information on the reaction mechanism and chemiluminescence for high temperature oxidation. In this study, pressure, OH, CH, CO, C2, and H2O emission and OH absorption were monitored during the reaction. Using a proposed 15 step reaction mechanism, temperature, pressure, and concentration profiles were calculated for the conditions of the experiment. The concentrations of the intermediates increased rapidly during the early stages of the reaction and then maintained a constant value through most of the induction period. Induction time was defined to be the time between the heating of the gas by the reflected shock wave and the rapid increase in pressure or characteristic emission or absorption. Carbon monoxide and H2O showed a rapid increase early in the induction period and then increased linearly to their equilibrium concentrations. Carbon dioxide increased linearly from the start and only at the end of the induction period did it increase rapidly. A peaking of CH emission was observed; however, OH emission and OH absorption were found to increase simultaneously during the reaction. From the pressure and CH emission, it was concluded that the reaction passes through two phases - a first phase in which the pressure and OH emission increase slowly, followed by a second phase in which the pressure and OH emission increase rapidly.

4288 APTIC NUMBER 13822

Serdyuk, L. S. and A. G. Tabachnikov
THERMODYNAMIC PROPERTIES OF NITRIC OXIDE AT 200-2000 K AND 1000 BAR. (Termodinamicheskiye svoystva okisi azota v intervale temperatur 200-2000 K i do davleniy 1000 bar). Text in Russian. Inzh. Fiz. Zh., 13(1):116-117, July 1967. 4 refs.

A previously derived equation of state was used to calculate molar density, enthalpy, and entropy for nitric oxide at each 100-deg interval from 200 to 1000 K and each 200-deg interval from 1200 to 2000 K for 18 different pressures ranging from 1-1000 bar. Three pages of data are tabulated.

4289 APTIC NUMBER 13670

Shaw, A. C. and K. T. Waldock
VANILLIN ANALYSIS AND ODOUR EVALUATION BY GAS CHROMATOGRAPHY. Pulp Paper Mag. Can., 68(3):T-118-T-122, 1967. 7 refs.

Separation by gas chromatography of vanillin and its co-products, formed during alkaline-air oxidation of lignosulfonates in waste sulfite liquor, can be accomplished on a variety of polar liquid phases. Retention times are relatively unaffected with increasing polarity of the liquid phase. Obtaining a well-defined symmetrical peak suitable for peak area measurements is more difficult. Polar materials commonly adsorb on chromatographic solid supports, and vanillin is particularly prone to do this. Adsorption is minimized on fluorocarbon supports, provided polar liquid phase loadings are kept within narrow loadings. Even on glass surfaces, vanillin tends to decompose during vaporization. Evidence suggests that vanillin can be vaporized from chloroform solution on a clean glass surface with negligible decomposition. In most of its applications, odor is an ultimate criterion of vanillin quality. An objective measurement of odor can be obtained by examination of the vapor in equilibrium with a finely divided vanillin sample. Gas chromatography reveals the presence of trace elements that are undetectable by direct chromatographic examination of the vanillin product.

4290 APTIC NUMBER 13639

Shera, Brian L. and Joseph B. Heitman
RELATIONSHIP OF OXIDATION-REDUCTION POTENTIAL TO FREE AVAILABLE CHLORINE IN PULP CHLORINATION. A PRACTICAL APPLICATION TO THE STUDY OF PULP CHLORINATION. Tappi, 48(2):89-94, Feb. 1965. 6 refs. (Presented at the Third International Pulp Bleaching Conference, Tech. Assoc. of the Pulp and Paper Industry, Seattle, Wash., Aug. 17-20, 1964.)

Oxidation-reduction potential corp measurements and the free available chlorine determinations are of considerable use in the study of the chlorination phase. An appendix describes the analytical procedure for available free chlorine determination. Carbon tetrachloride was used to selectively dissolve and separate free available chlorine from the pulp chlorination liquor. Rapid decline in the ORP indicates that free available chlorine no longer exists and the carbon tetrachloride extraction method is used for confirmation. Pulp chlorinations at various chlorine dosages, temperatures, and retention times were analyzed. Higher chlorine dosages and/or higher temperatures alone or in combination accelerate the degradation of cellulose fibers over the same retention period. Reduced retention periods to compensate for increased temperatures at teach level of chlorine dosage will permit equivalent fiber delignification and minimize further degradation of the cellulose. (Author abstract modified)

4291 APTIC NUMBER 13275

Sherma, Joseph
INORGANIC CHROMATOGRAPHY ON IMPREGNATED ION-EXCHANGE PAPERS. Anal. Chim. Acta, 36(1):138-141, Jan. 1966. 14 refs.

Phenylbenzohydroxamic acid (PBHA) was found to be a selective reagent for the paper chromatographic separation of metal ions followed by development with perchloric or hydrochloric acid. It is shown that PBHA combined with commercial ion-exchange paper containing polystyrene resins can achieve better separation of certain ions than those obtained on other stationary phases alone. The migration behavior of 0.050 M solutions of 26 ions was tested individually in different chromatographic systems. Each ion was also tested, for comparison, in systems including the same developers with unimpregnated ion-exchange paper and paper impregnated with reagent. Results were discussed for the 26 ions developed with 0.05 M HCl variations, potassium cyanide-ammonium oxalate-ammonia variations, and 0.10 M ammonium thiosulfate variations. In general, addition of a stationary complexing reagent to a stationary ion exchange phase resulted in greater or altered chromatographic selectivity.

4292 APTIC NUMBER 13516

Shiels, D. C.
THE ADSORPTION OF SULPHUR DIOXIDE BY PLATINUM BLACK. J. Phys. Chem., 33:1175-1183, 1929. 6 refs.

The adsorption of sulfur dioxide by platinum black was determined at 25 C and from 0 to 175 mm pressure. There appeared to be a strong reversible adsorption, and in addition, a weaker more reversible absorption which showed some hysteresis. Eighty-four volumes of sulfur dioxide at STP were adsorbed per volume of platinum, and fifty-four volumes were retained after heating the platinum black to 250 C for 8.5 hrs.

4293 APTIC NUMBER 13517

Shiels, D. C.
THE ADSORPTION OF SULPHUR DIOXIDE BY PLATINISED ASBESTOS. J. Phys. Chem., 33:1167-1174, 1929. 4 refs.

Studies were performed on the sulfur dioxide adsorbing capacity of platinized asbestos in the absence of air at 25 C and up to 40 mm pressure. Platinized asbestos had a greater adsorption rate than either platinum or asbestos alone. The adsorption was reversible, and there was a complete absence of hysteresis. At 20 mm, 11.6 vols SO2/vol platinum were adsorbed. The isotherm is represented accurately by Langmuir's equation.

4294 APTIC NUMBER 13566

Shiels, D. C.
THE SORPTION OF SULPHUR DIOXIDE, CARBON DIOXIDE, AND NITROUS OXIDE BY ACTIVATED CARBON. J. Phys. Chem., 33:1386-1397, 1929. 9 refs.

The adsorption of carbon dioxide, nitrous oxide, and sulfur dioxide by German activated gas-mask charcoal at 25 C was determined from 0 to 40 mm pressure for the first two gases, and from 0 to 22 mm pressure for sulfur dioxide. The amounts adsorbed at any given pressure were in the order of the respective critical temperature. The adsorption process was reversible in the case of carbon dioxide, but hysteresis occurred with nitrous oxide and sulfur dioxide. The adsorption of N2O and CO2 are represented by Patrick's equation and their isotherms nearly coincide.

4295 APTIC NUMBER 13376

Siedlewski, Janusz
MECHANISM OF CATALYTIC OXIDATION ON ACTIVATED CARBON. IV. INFLUENCE OF FREE RADICALS OF CARBON ON SO2 ADSORPTION. (Mechanizm katalitycznego utleniania na weglu aktywowanym. IV. Wplyw wolnych rodnikow wegla na adsorpcje SO2). Text in Polish. Roczniki Chem., 38(10):1539-1547, 1964. 29 refs.

The catalytic influence of activated carbon on the oxidation of SO2 to SO3 and the role of carbon free radicals in this reaction were studied. Three different carbon samples were prepared from saccharose at various temperatures and free radical concentrations. It was found that the amount of SO2 adsorbed depends on the surface area of the adsorbent, and not on its porous structure or free radical concentration. However, the amount of chemisorbed SO2 depends only on the number of free radicals present. The oxygen on a carbon sample which contains chemisorbed SO2 does not change the EPR signal, but oxygen on a pure carbon sample causes the signal to disappear completely. Thus it was concluded that the carbon free radicals are the active centers for the chemisorption of SO2. The bonds between the chemisorbed molecules and the carbon surface, in which the free radicals participate, are relatively weak and break during desorption at 70 C.

4296 APTIC NUMBER 13556

Siedlewski, Janusz
MECHANISM OF CATALYTIC OXIDATION ON ACTIVATED CARBON. I. THE INFLUENCE OF TEMPERATURE AND TIME OF CARBON DESORPTION ON ADSORPTION AND OXIDATION OF H2S AND SO2. (Mechanizm katalitycznego utleniania na weglu aktywowanym. I. Wplyw temperatury i czasu desorpcji wegla na adsorpcje i utlenianie H2S i SO2.) Text in Polish. Roczniki Chem., 38(7-8):1151-1160, 1964. 43 refs.

Surface adsorption of H2S and SO2 on activated carbon occurs both reversibly and irreversibly. Increases in reaction temperatures and purification times reduce total adsorption, due to a decrease in reversible adsorption. The formation of S likewise decreases with the amount H2S adsorbed permanently if the amount of carbon is increased slightly. The higher desorption temperature of the carbon leads, as a result of the decomposition of the more stable surface oxides, to an increase in the activated proportion of the surface. Irreversible adsorption of H2S occurs on the newly activated surface. The adsorption of both H2S and SO2 appears to occur on the same active places on the surface of the carbon, since

the adsorption isotherms of both substances are similar. Not all of the surface of the carbon participates in the adsorption process. The amount of SO2 that is irreversibly adsorbed is a linear function of the amount of surface represented by pores 25 to 200 A in diameter. Surface complexes of the form CxOySO2, which after decomposition give permanently adsorbed SO3 and SO2, have binding characteristics which are different with respect to the two sulfur oxides.

4297 APTIC NUMBER 13374

Siedlewski, J.
THE MECHANISM OF CATALYTIC OXIDATION ON ACTIVATED CARBON. THE CONTRIBUTION OF FREE CARBON RADICALS IN THE IRREVERSIBLE ADSORPTION OF HYDROGEN SULFIDE. Intern. Chem. Eng., no. 5(2): 293-296, April 1965. 15 refs. (Also: Roczniki Chem., no. 9:1355-1360, 1964).

An investigation of the contribution of free carbon radicals to the irreversible adsorption of H2S was prompted by an earlier study indicating that the number of free radicals on the surface of carbon does not change as the result of the adsorption of H2S. Determination of the electron paramagnetic resonance spectra of (1) pure carbon in a vacuum, (2) carbon with irreversibly adsorbed molecules of H2S, (3) carbon with irreversibly adsorbed molecules of H2S plus O2, and (4) pure carbon plus O2 has lead to the conclusion that the irreversibly adsorbed H2S protects the free radicals from contact with oxygen. Adsorption of oxygen by a carbon sample whose surface contained irreversibly adsorbed H2S does not cause any changes in the magnitude of the electron paramagnetic resonance signal, but oxygen adsorbed directly by a sample containing radicals causes complete disappearance of the signal. Since both the free radicals and the irreversibly adsorbed H2S cover only a relatively small surface of the carbon, it is suggested that the radicals are the active locations on the carbon surface that irreversibly adsorb H2S. The results also indicate the impossibility of the oxidation of the H2S molecules by molecular oxygen.

4298 APTIC NUMBER 13880

Siedlewski, J.
THE MECHANISM OF CATALYTIC OXIDATION ON ACTIVATED CARBON. THE ROLE OF FREE CARBON RADICALS IN THE OXIDATION OF SO2 TO SO3. Intern. Chem. Eng., 5(4):608-612, Oct. 1965. 14 refs. (Also: Roczniki Chem., 39(2):263-271, 1965.)

Free carbon radicals have been shown to have no influence on the maximum quantity of physically adsorbed SO2; rather, they constitute the active centers of the carbon surface in the chemisorption of SO2. The quantity of chemisorbed SO2 increases with a rise in concentration of free radicals on the carbon surface. If SO2 and O2 are introduced on the catalyst simultaneously, the increase in the mass of the catalyst as a result of the adsorption and oxidation processes which occur is found to be proportional to the size of the catalyst surface. However, the quantity of SO3 formed does not depend on the total amount of adsorbed reactants, but on the number of chemisorbed molecules. Samples of carbon characterized by the strongest signal in resonance spectrum have been found to have the maximum catalytic activity.

4299 APTIC NUMBER 13002

Simecek, A., B. Kadlec, and J. Michalek
THE REDUCTION-OXIDATION MECHANISM OF SULFUR DIOXIDE OXIDATION ON VANADIUM CATALYSTS. J. Catalysis, 14(4):287-292, Aug. 1969. 9 refs.

It is shown that the oxidation of SO2 on vanadium catalysts proceeds according to the oxidation-reduction mechanism. The validity of this mechanism was verified by a study of the oxidation rate dependence on the vanadium concentrations and kinetic measurements in two different types of industrial catalysts. It was found that the oxidation rate of sulfur dioxide is a first order one with respect to the total concentration of vanadium in the catalyst. Other results of this study, including temperature dependence and the reaction rate, are presented graphically or in tabulated form. (Author abstract modified)

4300 APTIC NUMBER 13190

Simonson, Rune
AUTOMATED METHOD FOR DETERMINATION OF HEMICELLULOSE IN THE PRESENCE OF LIGNIN. Svensk Papperstid., 70(17):537-539, Sept. 15, 1967.

A method is described for the determination of small amounts of hemicellulose in the presence of acid-insoluble lignin using Technicon's Auto Analyzer. The first reaction step involves hydrolysis of the hemicellulose in hydrochloric acid solution. In the second step, precipitated lignin is removed by passing the hydrolyzed sample through a dialysis cell. The hydrolysis products that pass through the membrane react with orcinol in the final step to give a color whose intensity is determined colorimetrically. The influence of lignin upon the chart reading and the reproducibility of the determination are discussed. (Author abstract)

4301 APTIC NUMBER 13318

Sinclair, G. D.
THE EFFECT OF COOKING AGENTS ON WOOD. I. ALKALINE COOKING OF POPLAR WOOD. EFFECT OF STRENGTH AND COMPOSITION. Pulp Paper Mag. Can., 65(11):T-516-T-520, Nov. 1964. 9 refs.

High-yield pulp processes were studied to determine desirable chemical concentrations and what components of wood are affected or removed under mild cooking conditions. Poplar heartwood and

sapwood samples were cooked in dilute solutions of NaOH, Na2SO4, and LiOH, with cooks made on five specimens at a time in a one-liter flask fitted with a reflux condenser. Data obtained show the amounts of holocellulose, pentosans, and lignin remaining in the cooked woods and the effects of both cooking time and chemicals on water sorption, weight loss, and wet breaking strength. The wet breaking strength of poplar heartwood was reduced from 292 lbs to 118 lbs after cooking with 8% NaOH for 2 hrs at 100 C. Poplar sapwood had an original strength of 386 lbs; this was reduced to 124 lbs after cooking for 2 hrs with 10% NaOH. The loss in weight during cooking was greater for sapwood than for heartwood, but sapwood sorbed less water than heartwood. Lithium hydroxide reduced the strength of the wood more than the other chemicals and also removed a greater percentage of wood. The more severe cooking removed more holocellulose than pentosans and lignin. It is concluded that there is a relation between the wet breaking strength of wood and the watt-hours of energy per pound needed for refining.

4302 APTIC NUMBER 13656

Slavyanskiy, V. T.
REACTION OF FOLTEN BOROBARIUM AND BOROSODIUM GLASS WITH SULFUR DIOXIDE. (O vzaimodeystvii rasplavlennykh borobariyevogo i bornonatriyevogo stekol s sernistym gazom). Text in Russian. Zh. Fiz. Khim., 30(9):2046-2050, 1956. 3 refs.

Sulfur dioxide gas was found experimentally to react readily with 2BaO.5B2O3 and Na2O.3.7B2O3 glass in the presence of atmospheric oxygen at 870-127C C to form barium sulfate and sodium sulfate. This was confirmed by plots of SO3 content (never more than 0.20 %) in borobarium glass as a function of temperature. Abrupt thermal decomposition of barium sulfate occurred at about 1200 C. Prolonged bubbling of SO2 through borosodium glass at 975 C results in separation of sodium sulfate as a second liquid phase. At elevated temperatures, sodium sulfate exhibits reduced solubility in the glass rather than undergoing decomposition, indicating greater stability of the sodium sulfate in boron glass.

4303 APTIC NUMBER 13580

Slutsky, S., J. Tanagno, and I. Fruchtman
AN ANALYSIS OF HYDROCARBON-AIR COMBUSTION FLAMES. Preprint, American Inst. of Aeronautics and Astronautics, New York, Technical Information Service, 51p., 1966. 11 refs. (Presented at the AIAA Second Propulsion Joint Specialist Conference, Colorado Springs, June 13-17, 1966, Paper 66-573.)

The overall structure of the combustion process in a jet flow of hydrocarbon-air mixtures was studied both experimentally and analytically. The hydrocarbons considered were methane, ethane, propane, and ethylene, with flame stabilization assured by a small oxy-hydrogen pilot. This research was essentially basic in nature; however, in choosing particular aspects for investigation, the selection was oriented toward fuels and conditions pertaining to supersonic combustion in ramjet engines. Flame propagation angles were determined by means of time exposure direct photographs, supplemented by measurements of mean total temperature and total static pressures for various values of stoichiometric equivalence ratios. The progress made in the incorporation of finite rate hydrocarbon chemistry with numerical techniques for the computation of flows with viscosity, diffusion, and heat transport is presented. The first case to date has been for the methane-air combustion system and has resulted in numerical solutions which are in good agreement with experiments. The formulation of mathematical models for the description of high speed combustion flames as described by the foregoing methane-air combustion has resulted in new insights into the mechanism of combustion rate phenomena in flames.

4304 APTIC NUMBER 13280

Smelt-Water Research Group
EXPLOSIONS IN KRAFT RECOVERY FURNACES. Southern Pulp Paper Mfr., 29(11):40-41, 44, 46, 48, Nov. 10, 1966.

The Smelt-Water Research Group was founded by 59 kraft pulping manufacturers to study the damaging explosions which occur in the kraft chemical recovery furnaces. Kraft recovery furnaces contain molten chemicals (smelt) which explode when contacted with water. A report of the findings and recommendations of the Smelt-Water Research Group is presented. A major result of the study was the identification of the physical nature of the smelt-water explosions and the effects of some of the factors influencing their occurrence and intensity. Water, or water solutions of any of the chemicals commonly present in the recovery furnace systems (other than black liquor at concentrations of 55 to 70% total solids or higher), can cause destructive explosions if permitted to contact molten smelt. Smelt-water explosions were shown in the laboratory to be noncombustible in nature. They were extremely rapid, with pressure peaks of about one millisecond duration, producing shock waves which frequently shattered graphite crucibles. High-speed motion pictures demonstrated that explosions originated at a point beneath the smelt surface and occurred very rapidly upon injection of water. All these facts are consistent with a hypothesis of encapsulation of submerged water by smelt to produce an initial explosion. As yet, however, the encapsulation mechanism has not been conclusively demonstrated and direct proof may be very difficult. Recommendations include not adding any water except black liquor, installing monitoring systems, and the use of air lances to aid combustion. The need for automatic shutdown installations is stressed.

4305 APTIC NUMBER 12949

Soda, Reiten
POLLUTED AIR PRODUCTION WITH GASEOUS PARTICLES. (Gasujo no osenbutsu ni yoru osen-kuki sakuseiho). Text in Japanese. Kuki Seijo (Clean Air-J. Japan Air Cleaning Assoc., Tokyo), 6(7):10-17, 1969. 17 refs.

Special techniques have been devised using scattering cells, permeation tubes, or multiple step dilution to obtain a reproducible contaminated atmosphere. Artificially polluted air is used not only in the evaluation of a high efficiency air filter, but also in the experimental analysis of harmful effects on animals. Different gas particles are used and gas concentrations are also varied for different experiments. For example, CS2 (0.1 ppm) and C6H6 (1 ppm) are used for animal inhalation experiments and hydrocarbons (100 ppm), SO3 (10 ppm), and nitrogen oxides (10 ppm) are used for the measurement of collection ratios of high efficiency air filters. To perform these experiments and measurements correctly, purity, concentration, temperature, and pressure of the polluted gas should be stable.

4306 APTIC NUMBER 13377

Somlyo, Avril V. and Andrew P. Somlyo
VASOTOCIN-MAGNESIUM INTERACTION IN VASCULAR SMOOTH MUSCLE OF THE HAGFISH (EPTATRETUS STOUTII). Comp. Biochem. Physiol., 24(1): 267-270, Jan. 1968. 10 refs.

The sensitivity of vascular smooth muscle of cyclostome fish to the neurohypophysial peptides vasotocin, oxytocin, and arginine vasopressin was observed, and the stage of phylogenesis at which the interaction between magnesium and these peptides appeared was deduced. Vascular smooth muscle of Eptatretus stoutii was extremely sensitive to the vasoconstrictor action of vasotocin (less than 1C to the minus 10th power M). The vasoconstrictor effect of neurohypophysial peptides was potentiated by Mg or Mn in the manner seen in birds and mammals. These findings suggest that vascular activity of posterior hormones, and their interaction with Mg appeared during the earliest stage of vertebrate phylogenesis. (Author abstract modified)

4307 APTIC NUMBER 13007

Soo, Shao L., James J. Stukel, and J. Martin Hughes
MEASUREMENT OF MASS FLOW AND DENSITY OF AEROSOLS IN TRANSPORT. Environ. Sci. Technol., 3(4):386-393, April 1969. 8 refs.

Accurate methods for determination of the local mass flow and density of aerosol particles in a suspension include differential isokinetic sampling with a correction of depletion, and fiber optic measurement of the density of particles. These two probes can be combined into a single probe. Within the capability of the filters used, there is no lower limit for isokinetic sampling; the lower limit of fiber optics probe was 0.C15 kg/sq m. The average charge: mass ratio of a particle cloud can be determined using the same sampling probe. (Author abstract modified)

4308 APTIC NUMBER 13266

Speckmann, Elwood W. and Marion F. Brink
RELATIONSHIPS BETWEEN FAT AND MINERAL METABOLISM-A REVIEW. J. Am. Dietet. Assoc., vol. 51:517-522, Dec. 1967. 51 refs.

The interrelationship between mineral and fat metabolism is complex and only partially understood. Minerals may act directly on fats or indirectly through their activation of enzymes involved in lipid metabolism. It appears that calcium and fat absorption may be interrelated; impairment of the absorption of either leads to impaired absorption of the other. Calcium has been demonstrated to decrease elevated blood lipids in animal and man. Magnesium is related to cholesterol metabolism and prevents its accumulation in the blood. Cadmium in air was correlated with death rates from hypertension and arteriosclerotic heart disease in 28 cities in the United States. Zinc was the only other air pollutant that correlated significantly with heart disease rates, but to a lesser degree. Chromium may inversely influence glucose and lipid metabolism Manganese, copper, selenium, vanadium, and possibly other trace minerals also may play integral roles in the metabolism of lipids. (Author summary modified)

4309 APTIC NUMBER 13222

Spiro, Thomas G., William A. Kjellstrom, Marielouise Zeydel, and Ronald A. Butow
ON THE KINETICS OF METAL-CATALYZED ADENOSINE TRIPHOSPHATE DEPHOSPHORYLATION. Biochemistry, 7(2):859-865, Feb. 1968. 21 refs.

Analysis of Tetas and Lowenstein's rate data (Biochemistry 2:351, 1963) on metal ion catalysts of adenosine triphosphate (ATP) and adenosine diphosphate (ADP) dephosphorylation reveals that the role of the metal is not limited to the acceleration of water attack on phosphate linkages or of elimination of metaphosphate. Such mechanisms are enhanced by chelation of manganese(II) to ATP, but are actually inhibited for the manganese-ADP chelate, although hydroxyl attack is accelerated in the latter case. For the copper(II)-ATP systems, a completely new mechanism dominates the kinetics, one involving proton attack on the dimeric hydroxy chelate, (CuATP(OH))2(6-). Involvement of this dimer is confirmed by a study of the concentration dependence of the rate. On dilution, the pseudo-first order rate constant decreases in parallel with the dimer concentration. A similar mechanism is probably operative in the Zn(II)-ATP system. (Author abstract modified)

4310 APTIC NUMBER 13834

Sprunk, George C. and H. J. O'Donnell
MINERAL MATTER IN COAL. Bur. Mines Tech. Paper 648. Bureau of Mines, Washington, D. C., 1942, 67p. 54 refs.

The occurrence and distribution of the most important microscopic forms of mineral matter in coal are described. The minerals

were identified in thin sections of coal by means of the petrographic microscope. The most common minerals observed in the thin sections were kaolinite, pyrite, calcite, quartz, and siderite. Methods of identifying extraneous matter in the thin sections included immersion, microchemical, chemical, and x-ray methods. In addition to the major minerals, minor quantities of apatite, muscovite, zircon, epidote, biolite, augite, kyanite, rutile, staurotite, topaz, tourmaline, and chloritic material were present. Kaolinite was found in cleat joints, small cracks, fusain, resin rodlets, and attritus or ground mass of coal and in irregular impure masses imbedded within the coal. Iron pyrites occur in lenses and bands, balls or nodules, veins, pyritized fossils, and in finely disseminated particles. Calcite exists as veins in coal, particularly in the cleats and fractures. It is also found in fusain and in the ground mass of calcareous clay and shale partings. Siderite is present as nodules and as impure lenses and bands. Quartz is found in high-ash and bone coals. It is believed that the petrographic study of mineral matter in coal will have considerable practical value in planning an intelligent program of improving fuels by selective mining or coal cleaning.

4311 APTIC NUMBER 13483

Spurny, K. and J. P. Lodge, Jr.
ANALYTICAL METHODS FOR DETERMINATION OF AEROSOLS BY MEANS OF MEMBRANE ULTRAFILTERS. XI. STRUCTURAL AND FILTRATION PROPERTIES OF NUCLEAR PORE FILTERS. Collection Czech. Chem. Commun., 33(11): 3679-3693, Nov. 1968. 23 refs.

The structure and filtration properties of nuclear pore filters (NPF) were studied through both theoretical and experimental approaches. Equations for slippage, impaction, diffusion, and direct interception are given for these filters. The smooth surface, regular cylindrical pore shape, and the perpendicularity of the pores to the filter surface simplify mathematical analysis. The most important differences found between the NPF and membrane filters (MF) are: that the structure of the NPF is more simple and homogeneous than that of the MF; thickness of the NPF is about one-tenth that of the MF; the relative pore volume of the NPF is less than one-tenth that of the MF; and the NPF is practically non-hygroscopic. The results of the investigations show that the NPF is not a better filter than the MF from the standpoint of efficiency, pressure drop, and cost. It cannot fully replace the MF but can complement it very well.

4312 APTIC NUMBER 13460

St. Pierre, George R. and John Chipman
SULFUR EQUILIBRIA BETWEEN GASES AND SLAGS CONTAINING FeO.
J. Metals, Vol. 8, p. 1474-1483, Oct. 1956. 20 refs.

Ferrous oxide slags with additions of CaO, SiO2, and MgO were equilibrated with atmospheres of sulfur dioxide containing additions of carbon monoxide and oxygen. At low partial pressures of oxygen, sulfur is present as sulfide, and at higher pressures, as sulfate. At constant oxygen and sulfur pressures, sulfur absorption as sulfide is nearly independent of the ratio CaO/FeO, but is decreased by addition of SiO2 or MgO. The presence of CaO is necessary for ,absorption of sulfur as sulfate.

4313 APTIC NUMBER 13303

Steenbergen, Sue (Tonnis) and Eugene D. Weinberg
TRACE METAL REQUIREMENTS FOR MALFORMIN BIOSYNTHESIS. Growth, 32(2):125-134, June 1968. 22 refs.

'Aspergillus niger' produces a family of phytotoxic cyclic pentapeptides called malformins. These substances fulfill five criteria established for secondary metabolites. A possible sixth criterion is that the biosynthesis of secondary metabolites is more sensitive to environmental fluctuations in quantity of one or more specific trace than is true for that of primary metabolism of the producing organism. The concentrations of two of seven biologically active trace metals were observed to be critical for malformin biogenesis. Manganese, at quantities between 0.000001 and 0.00001 M, was required for toxin formation. Higher amounts suppressed toxigenesis but had no effect on sporulation. Zinc prevented malformin synthesis, as well as spore formation, at concentrations between 0.00005 and 0.0003 M. Neither metal, at the quantities studied, affected the rate of extent of vegetative growth or total protein synthesized. A comparison was made of the ratio of malformin to cell protein in a low metal, low phosphate synthetic medium and in a complex medium. In the former, the final ratio by weight of toxin to cell protein was 1:2.3; in the latter, 1:8. Previous studies of biosynthesis of secondary metabolites have likewise shown that higher yields of these substances, relative to yield of cells are obtained in metal-controlled, low phosphate environments. (Author abstract modified)

4314 APTIC NUMBER 13228

Stirpe, F. and L. Fiume
EFFECT OF ALPHA AMANITIN ON RIBONUCLEIC ACID SYNTHESIS AND ON RIBONUCLEIC ACID POLYMERASE IN MOUSE LIVER. Biochem. J., 103(3):67P-68P, June 1967. 4 refs.

The effects of alpha-amanitin, the toxin of the toadstool Amanita phalloides, on the synthesis of RNA in mice liver were investigated. The activities of the Mg(2+)-activated and of the Mn(2+)/(NH4)2SO4-activated RNA-polymerase reactions were determined in isolated nuclei. The activity of the Mn(2+)/(NH4)2SO4-activated reaction was decreased by 70% in nuclei isolated from mice given alpha-amanitin 1 to 3 hrs before sacrifice. Alpha-amanitin added in vitro to normal nuclei inhibited the reaction by about 80%. The Mg(2+)-activated polymerase was not affected either by the in vivo intoxication or by the addition of alpha-amanitin in vitro.

4315 APTIC NUMBER 13432

Stober, Werner and Hermann Flachsbart
AEROSOL SIZE SPECTROMETRY WITH A RING SLIT CENTRIFUGE. Environ. Sci. Technol., 3(7):641-651, July 1969. 25 refs.

This paper describes the design and the performance of a modified centrifuge having an aerosol inlet in the form of a ring slit. The modification was designed to facilitate high aerosol sampling rates at reasonable size resolutions in terms of aerodynamic diameters. In the size range between 0.0004 and 0.00003 cm, the instrument permits sampling rates of 1L/min or more at a size resolution of better than 7%. In any single test run, a size range of about one order of magnitude can be resolved. These results indicate that the ring slit centrifuge is performing close to the optimum efficiency expected from theoretical considerations. For the size range between 0.00003 and 0.000006 cm, the sampling rate fell short of the theoretical expectations and had to be reduced about 0.1 L/min to yield acceptable results. This rate is comparable with maximum sampling rates of other centrifuge designs. It appears to be the upper limit at high rotor speeds and low linear flow velocities for centrifuge versions with aerosol entrainment under tangential accelerating forces. Authors' abstract modified)

4316 APTIC NUMBER 13902

Stolovitskaya, M. M.
RECRYSTALLIZATION OF CALCIUM OXIDE WHEN CALCINING LIME IN SUSPENSION. (O rekristallizatsii okisi kal'tsiya pri obzhige izvesti vo vzveshennom sostoyanii). Text in Russian. Sb. Tr. Vses. Nauchn.-Issled. Inst. Stroit. Materialov i Konstruktsii, no. 6:114-117, 1966. 4 refs.

The dependence of phase composition of lime and degree of recrystallization on calcination temperature was studied with limestone having the following composition: SiO2, 3.98%; Al2O3, 0.4%, Fe2O3, 0.3%; CaO, 51.42%; MgO, 0.77%; SO3, 0.24%; and ignition losses, 42.2%. Calcination was carried out for 0.25 Sec at 1100, 1200, 1300, and 1400 C and approximate mineralogical composition was then determined by x-ray diffraction. Calcium oxide content reached a maximum of 99% and CaCO3 content a minimum of 1% at 1300 C. Petrographic studies revealed that the specific surface of the lime decreases as the CaO crystal diameter increases with calcination temperature. It is concluded that calcination is optimum in the 1200-1400 C range, yielding a product which completely satisfies requirements for making parts of autoclaved concrete.

4317 APTIC NUMBER 13354

Stopperka, F., P. Wolf, and G. Suss
INVESTIGATIONS INTO THE REACTIONS BETWEEN NITROGEN DIOXIDE AND SULFUR DIOXIDE IN THE GAS PHASE. (Untersuchungen uber die Umsetzung zwischen Stickstoffdioxid und Schwefeldioxid in der Gasphase). Text in German. Z. Anorg. Allgem. Chem., 359(1/2): 14-29, June 1968. 21 refs.

After reviewing earlier work on nitrogen dioxide/sulfur dioxide reactions, it is concluded that the catalytic action of water was never properly investigated. In the present work, the gas phase interaction between NO2 and SO2 at H2O partial pressures of 0.005 Torr and 0.000001 Torr and temperatures up to 230 C were manometrically investigated. At an H2O partial pressure of less than 0.000001 Torr, the reaction started at 225 C according to the equations: 2 NO2 yields 2 NO plus O2; 2 SO2 plus O2 yields 2 SO3; and 2 SO3 plus NO2 plus NO yields (NO)2S2O7. In the presence of water vapor at a partial pressure less than 0.005 Torr, the reaction 3 NO2 plus 2SO2 plus H2O yields 2 HOHSO4 plus NO proceeds rapidly even at 25 C. An equilibrium between N2O3 and NO2 plus NO is established. After all water is consumed, the reaction doesnot stop, but it changes to the following: 3 N2O3 plus 2 SO2 yields (NO)2S2O7 plus 4 NO, and NO plus 3 NO2 plus 2 SO2 yields (NO)2S2O7 plus 2 NO. During all reactions, the walls of the vessels were covered by hard, white crystals which were identified as (NO)2S2O7 with admixtures of NOHSO4. Since this reaction is important for gypsum-sulfuric acid plants, other catalysts were investigated. Glass wool, Pt-asbestos, rust, and V2O5 did not influence the reaction other than as water carriers. The apparatus used is described and the compound (NO)2S2O7 was identified by its melting point and Debye pattern.

4318 APTIC NUMBER 13096

Subba Ramu, M. C. and K. G. Vohra
INVESTIGATIONS ON RADIOACTIVE EQUILIBRIUM IN THE LOWER ATMOSPHERE BETWEEN RADON AND ITS SHORT-LIVED DECAY PRODUCTS. Tellus, 21(3):395-403, 1969. 7 refs.

The variations in the degree of equilibrium between radon and its short-lived decay products were studied at 2 m above the ground surface at a selected location near Trombay, Bombay, India. The correlations between the degree of equilibrium and different meteorological parameters such as atmospheric stability, wind speed and direction, atmospheric pressure, temperature, relative humidity, and rainfall, were studied. Diurnal and seasonal variations in the concentration of radon and in the degree of equilibrium were also studied. The degree of equilibrium was found to range from 4 to 100% depending on meteorological conditions. This was studied by making simultaneous measurements of actual radon decay product activity in a sample of air and the equilibrium decay product activity in the same air. The degree of equilibrium is defined as the percentage of equilibrium daughter product activity actually present in a sample of air. The equilibrium daughter product activity was measured by filtering out the daughter products from a known volume of air and subsequently allowing the daughter products to grow to equilibrium concentration in the presence of aerosols in a reservoir. The application of these investigations in understanding the mixing processes in the lower atmosphere are discussed. (Author abstract modified)

4319 APTIC NUMBER 13340

Sulochana, C. P. and M. Lakshmanan

ASPERGILLUS NIGER TECHNIQUE FOR THE BIOASSAY OF MANGANESE. J. Gen. Microbiol., vol. 50:285-293, Feb. 1968. 20 refs.

Investigations were conducted to determine whether (1) it is possible to obtain decreases in mycelial yield of the fungus Aspergillus niger in manganese-deficient culture in an otherwise optimum nutrient solution, and (2) the growth of the organism is reproducibly and quantitatively proportional to graded increments in the concentration of manganese for the purpose of selecting a strain for bioassay of manganese. The rates of growth of five strains of Aspergillus niger (M, MUPLI, NRRL334, NRRL323, NRRL346) were followed in an optimum nutrient solution. The time course of growth of all the strains showed a steep decrease after 3 days, except that of strain NRRL346, which tended to flatten out. A correlation between sporulation and mycelial dry weight was observed. All five strains showed a marked decrease in mycelial yield in the absence of manganese from the basal medium. Their quantitative responses to graded concentrations of Mn in the medium were compared with spore and mycelial inocula. Statistical analyses of the result suggest that strain MUPLI is the most suitable test organism for the bioassay of Mn. The effective range of concentrations of Mn which coincided with the maximum differences in mycelial dry weights was 0.001 to 0.006 micrograms/ml, which is 100-fold more sensitive than the spectrophotometric method. (Author summary modified)

4320 APTIC NUMBER 13006

Suzuki, S., K. Kumasaka, and S. Abe
STUDIES ON IMPACTION OF MIST ON LIQUID SURFACE. (Misuto no ekikaimen deno shototsugensho ni kansuru kenkyu). Text in Japanese. Kuki Seijo (Clean Air-J. Japan Air Cleaning Assoc., Tokyo), 6(7):1-9, 1969. 2 refs.

The behavior of a mist was studied at the moment when it impacted with a plain surface of water. A mist either rebounded or coalesced at the surface. When the mist ispacted on a surface with a smaller than critical angle, it rebounded at the surface, but when it impacted with a larger than critical angle, it was captured by the surface. The critical angle was considered to be a function of size, specific density, velocity, and other factors of a mist. The confirmation of these points was carried out by using Jayaratne and Mason's method. The size was varied in the range of 500-800 microns, specific density in the range of 1.005-1.160, and impaction velocity in the range of 50-110cm/sec. The experiments showed that the initial angle decreased with the size of a mist and increased with the impaction velocity and specific density. (Author abstract modified)

4321 APTIC NUMBER 13107

Takagi, S. F., M. Kitamura, K. Imai, and R. Takeuchi
FURTHER STUDIES ON THE ROLES OF SODIUM AND POTASSIUM IN THE GENERATION OF THE ELECTRO-OLFACTOGRAM. EFFECTS OF MONO-, DI-, AND TRIVALENT CATIONS. J. Gen. Physiol., 53(1):115-130, Jan. 1969. 47 refs.

In the negative electro-olfactogram (EOG) generating process a cation which can substitute for Na(+) was sought among the monovalent ions, Li(+), Rb(+), Cs(+), NH4(+), and tetraethylammonium, the divalent ions, Mg(2+), Ca(2+), Sr(2+), Ba(2+), Zn(2+), Cd(2+), Mn(2+), Co(2+), and Ni(2+), and the trivalent ions, Al(3+) and Fe(3+). In Ringer solutions in which Na(+) was replaced by one of these cations, the negative EOG's decreased in amplitude and could not maintain the original amplitudes. In K(+)-Ringer solution in which Na(+) was replaced by K(+), the negative EOG's reversed their polarity. Recovery of these reversed potentials was examined in modified Ringer solutions in which Na(+) was replaced by one of the above cations. Complete recovery was found only in the normal Ringer solution. Thus, it was clarified that Na(+) plays an irreplaceable role in the generation of the negative EOG's. The sieve hypothesis which was valid for the positive EOG-generating membrane or IPSP was not found applicable in any form to the negative EOG-generating membrane. The reversal of the negative EOG's found in K(+)- , Rb(+)- , and Ba(2+)-Ringer solutions was attributed to the exit of the internal K(+). It is, however, not known whether or not Cl(-) permeability increases in these Na(+)-free solutions and contributes to the generation of the reversed EOG's. (Author abstract modified)

4322 APTIC NUMBER 13308

Takeda, Kimihisa
PERMEABILITY CHANGES ASSOCIATED WITH THE ACTION POTENTIAL IN PROCAINE-TREATED CRAYFISH ABDOMINAL MUSCLE FIBERS. J. Gen. Physiol., vol. 50:1049-1074, March 1967. 59 refs.

Permeability changes associated with prolonged action potentials were analyzed in procaine-treated crayfish abdominal muscle fibers. The effect of external Ca indicated that the increase in membrane conductance observed during the rising phase of the action potential was primarily due to a permeability increase for Ca. A remnant of the permeability increase replaced the succeeding plateau as was shown by its high conductance and by the effect of low Na. A delayed increase in conductance preceded the termination of the plateau phase. This was due to a delayed increase in permeability, probably for K, that was observed when depolarizing electrogenesis was eliminated. High external Ca reduced the action potential duration, the falling phase starting at a higher depolarization. These changes may be related to an earlier onset of the delayed increase in permeability, induced by a larger inside positivity in the presence of higher Ca. No anomalous rectification was seen in early or late I-V curves for small depolarizations. Barium replaced Ca in its role in depolarizing electrogenesis, and the first action potential induced in Ba saline had a large overshoot and a long duration. In higher Ba salines, action potentials were greatly prolonged. Long-term soaking in Rb-containing or K-free saline also augmented and prolonged the action potential. These changes were assumed to be related to depression of the K permeability of the membrane. (Author abstract modified)

4323 APTIC NUMBER 13097

Takenata, Toshifumi and Shunichi Yamaguchi
MORPHOLOGY AND ELECTROPHYSIOLOGICAL PROPERTIES OF SQUID GIANT AXONS PERFUSED INTRACELLULARLY WITH PROTEASE SOLUTION. J. Gen. Physiol., 53(1):61-96, Jan. 1969. 27 refs.

Squid giant axons were perfused intracellularly with solutions containing various kinds of proteases (1 mg/ml). Except for a 10 micron layer inside the axolemma, the axoplasm was removed by a 5 min perfusion with Bacillus protease, strain N' (BPN'). The resting and action potentials were unchanged, and the axon maintained its excitability for more than 4 hrs on subsequent enzyme-free perfusion. After perfusion with protease solution for 30 min, the axoplasm was almost completely removed. The excitability was maintained, but the action potential became prolonged and rapidly developed a plateau of several hundred milliseconds. The change was not reversible, even when the enzyme was removed from the perfusing fluid. Two other enzymes, pronase and bromelin, also removed the protoplasm without blocking conduction. Trypsin suppressed the excitability of the axon within 3 min. It is suggested that the proteases alter macromolecules in the excitable membrane and thus affect the shape of the action potential. (Author abstract modified)

4324 APTIC NUMBER 13533

Tandy, G. H.
THE ROLE OF ALKALI SULPHATES IN VANADIUM CATALYSTS FOR SULPHUR DIOXIDE OXIDATION. J. Appl. Chem. (London), 6:68-74, Feb. 1956. 5 refs.

The chemical composition of alkali metal sulfates-vanadium oxide mixtures in equilibrium with sulfur dioxide-sulfur trioxide air mixtures was investigated. Gas mixtures were prepared from a 5% SO2-95% air mixture, the ratio of SO2 to SO3 being maintained at the equilibrium value corresponding to the temperature of each run. Experiments were carried out with mixtures of V2O5 and one alkali metal sulfate (Na, K, Rb, or Cs) at 380-600 deg. From 440 to 600 deg a liquid is formed consisting of vanadium compounds dissolved in an alkali pyrosulfate-sulfate mixture. The melting point of the mixture decreases with increasing atomic weight of alkali metal used. The level of reduction in the V2O5 remains fairly constant from 550-480 deg in the Na2SO4 mixture, from 440-600 in the K2SO4 mixture, and from about 410-520 deg in the rubidium and cesium sulfate mixtures. Below these temperatures there is a marked increase in the extent of reduction of sodium, potassium, and cesium. Thus potassium is more effective in stabilizing the vanadium in the pentavalent state than sodium. Rubidium and cesium are even more effective.

4325 APTIC NUMBER 13936

Thompson, R. B. and G. Poellner
FLUID BED ROASTING - PRINCIPLES AND PRACTICE. In: Extractive Metallurgy of Copper, Nickel, and Cobalt, Paul Queneau (ed.), Am. Inst. Mining, Met., Petrol. Engrs., 1961, p. 3-32. (Based on a Symposium sponsored by the Extractive Met. Div. Met. Soc., Am. Inst. Mining, Met., Petrol. Engrs., New York, N. Y., Feb. 15-18, 1960.)

Fluidized bed techniques used in roasting iron sulfides can be successfully applied to many metallurgical processing problems, especially those involving copper, cobalt, and nickel concentrates. Not only is environmental uniformity possible, with respect to temperature and chemical composition, but temperature and gas composition can be controlled with a high degree of precision, allowing full advantage to be taken of the thermodynamic characteristics of the systems (Cu, Co, Ni), S, O2. By regulating the temperature and the ratio of air to sulfides, it is possible to convert metals to their respective oxides or, in the case of Cu and Co, to their sulfates. Since the latter metals can be sulfated at controlled temperatures, the product undergoes maximum shrinkage and is particularly reactive to further gas phase reaction or hydrometallurgical treatment. Temperature control is the important factor in maximizing the extraction of copper and cobalt and minimizing the sulfating of iron. Progress is reported in the roasting of flotation pyrites and pyrrhotites, cupriferous pyrites, and pyrometallurgical recovery from copper concentrates. Though chalcopyrite concentrates are susceptible to fluidized bed treatment, the technique is expected to find wider application with chalcocite concentrates.

4326 APTIC NUMBER 13850

Thompson, R. Paul
PLATINUM VS. VANADIUM PENTOXIDE AS CATALYSTS FOR SULFURIC ACID MANUFACTURE. Trans. Am. Inst. Chem. Engrs., vol. 27:264-309, Dec. 1931.

Platinum catalysts, including platinized asbestos, platinized magnesium sulfate, and platinized silica gel, are compared economically and technically with vanadium catalysts on the basis of data derived from sulfuric plant operations. The catalysts are evaluated by such factors as initial costs, cost of catalyst per daily ton of 100% acid per year, ultimate cost, ability to handle gas with a low oxygen to sulfur dioxide ratio, converter space required, relationship of gas loading or space velocity to conversion, and life expectancy. Platinized contact masses are shown to be cheaper from every standpoint than vanadium masses. The 1931 cost of an ounce of platinum is only 8.57 cents per ton of acid produced. The costs for vanadium masses are 2.8 to 5.1 times higher, with one vanadium catalyst costing nearly 46 cents per ton of acid produced. With regard to relative effectiveness, platinized catalysts have a lower kindling temperature, a greater activity over a much wider temperature range, and they excel in handling gases whose sulfur dioxide content varies from time to time. Their greater activity with gases of varying sulfur dioxide content over broad temperature ranges simplifies converter design and operation. Like vanadium catalysts, platinized silica gel is not poisoned by arsenic present in the gas being treated. Additional cost and purification data on contact sulfuric acid catalysts are given in a discussion appended to the article.

4327 APTIC NUMBER 13319

Thompson, N. S., J. W. Peckman, and E. F. Thode
STUDIES IN FULL CHEMICAL PULPING. II. CARBOHYDRATE CHANGES AND RELATED PHYSICAL EFFECTS. Tappi, 45(6):433-442, June 1962. 49 refs.

The chemical nature of various xylan components of black spruce pulps was established by extraction and fractionation experiments with pulps cooked at all pH levels to equal degrees of delignification. All pulps cooked between pH 1.5 and 6 were found to contain a 4-O-methylglucuronoxylan. Full chemical pulps cooked at pH 9 to 11 contained a 4-O-methylglucuronoaraboxylan whose composition resembled the composition of the original polymer of spruce holocellulose. Kraft pulps were characterized by the presence of an araboxylan. Also detected in all pulps, but not isolated, were glucomannan polymers. A galactoglucomannan was identified in alkaline pulps cooked at pH 9 to 12.5. Differences in the nature and the distribution of the hemicellulose components in the various pulps suggests that accessibility of hemicellulose to alkali changes at different pH levels. The hemicellulose contents of the pulps were found to be relatively constant, by the yield of cellulose varied considerably. As indicated by its low yield and low viscosity, cellulose was the least stable component at neutral pH. Three types of carbohydrate degradation occurred during the pulping processes: acid-catalyzed degradation of glycosidic bonds, peeling, and alkaline hydrolysis of glycosidic bonds. A fourth type probably occurs at neutral pH, but its nature is not known.

4328 APTIC NUMBER 13950

Thurlow, G. G.
FLUID BED COMBUSTION. Preprint, Combustion Engineering Assoc., Hayes, Great Britain, 16p. Nov. 11, 1968. (Presented at the Combustion Engineering Assoc. Meeting, Birmingham, Great Britain, Oct. 15, 1968, Document A533.)

The technology of fluidized bed combustion and current research and design efforts in its development are described; the application of this system to steam and hot-water boilers is considered potentially the most important advance in the burning of coal since pulverized fuel firing. The principle of the system is to feed coal into a fluidized bed of coal and ash particles; the coal is rapidly dispersed throughout the bed, reacts with the incoming air, and so is burned. The rapid motion of the particles gives a high rate of turbulent mixing and produces a reaction between the coal particles and the air passing through the bed; also, these same rapidly moving particles lead to a high rate of heat transfer between the bed and surfaces in contact with it. By extracting heat from the bed as combustion proceeds, it becomes possible to keep the bed temperature below that at which the particles sinter while maintaining a high rate of chemical reaction and therefore heat release rate. Consequently, unlike earlier proposals of combustion units using fluidization, the ash particles do not get sticky and coalesce, but remain as discrete particles, allowing the heat transfer surfaces to stay clean and effective. By carrying out at least 50% of the heat transfer to the water or steam tubes with the bed, it is expected that smaller, cheaper boilers can be utilized. In addition, the fact that no surfaces are exposed to high gas temperatures should lead to savings in maintenance, while the low bed temperatures should reduce problems of corrosion, deposition, and atmospheric pollution. Other advantages, such as in the types and size of coal that can be burned, are also foreseen. Details of the process are given, and its application to power station water tube type boilers and industrial shell-type boilers is described. It is emphasized that the system is still in the developmental stage, with many problems still to be worked out. A record of extensive discussions by participants at this and two subsequent meetings is included.

4329 APTIC NUMBER 13654

Tikhonov, A. I., S. K. Chuchmarev, V. I. Smirnov, and V. I. Rybnikov
REACTION KINETICS OF NICKEL SULFIDE WITH NICKEL OXIDE IN A BOILING LAYER. (Kinetika vzaimodeystviya sul'fida nikelya s yego zakis'yu v kipyashchem sloye). Text in Russian. Doklady Akad. Nauk SSSR, 178(3):650-652, 1968. 18 refs.

Kinetics of the reaction Ni3S2 plus 4NiO yields 7Ni plus 2SO2 at 1000, 1100, and 1200 C in a boiling layer with a rising flow of argon were studied through continuous conductometric measurement of the SO2 evolved. Desulfurization rate constants are derived for these three temperatures. These values indicate that reaction of Ni3S2 with oxygen to yield NiO and SO2 goes much faster than the reaction with NiO to yield Ni and SO2. The total oxidation process appears to be accelerated by the influence of the so-called 'solid' oxygen.

4330 APTIC NUMBER 13461

Tikhonova, Z. I. and V. A. Zore
SPECTROSCOPIC DETERMINATION OF MANGANESE, COPPER, ALUMINUM, LEAD AND TIN IN CERTAIN VEGETABLES AND BERRIES. (Spektral'noe opredelenie margantsa, medi, alyuminiya, svintsa i olova v nekotorykh ovoshchakh i yagodakh.) Hyg. Sanit. (English translation of: Gigiena i Sanit.), 33(3):62-64, 1968. (8) refs.

A method for the simultaneous quantitative spectroscopic determination of manganese, copper, aluminum, lead, and tin in vegetables and berries is described. The product was brought to a constant weight, ashed, and placed in the crater of a carbon electrode. The sample was compacted and ignited in an a.c. arc, and its spectrum photographed. The error of the method was within 6% for copper, lead, and tin, and 10% for manganese and aluminum. Among the products tested, the highest manganese concentrations were found in cranberry, dill, and dog rose. The highest concentrations of copper occurred in black currants, dill and dog rose, and those of aluminum in dill, black currants and ''blackberry'' mountain ash. Further qualitative spectroscopic determinations were made of the elements Mn, Pb, Sn, Si,

Fe, Al, Tl, Mo, Cu, Co, Zn, Ni, Cr, Ag, Mg, V, K, Ca, Na, P, and Sr. Every product contained all or nearly all these elements. The findings may be of help in the estimation of the content of trace elements in food.

4331 APTIC NUMBER 13375

Tkach, Yu. A. and O. K. Davtyan
STUDIES ON THE MECHANISM OF OXIDATION, HYDROGENATION AND ELECTROCHEMICAL COMBUSTION ON SOLID CATALYSTS. VI. CONCERNING THE ACTIVE CENTERS AND THE APPEARANCE OF THE OXYGEN POTENTIAL ON CARBON. (Issledovaniye mekhanizma okisleniya, gidrirovaniya i elektrokhimicheskogo goreniya na tverdykh katalizatorakh. VI. Ob aktivnykh tsentrakh i o vozniknovenii kislorodnogo potentsiala na ugle). Text in Russian. Zh. Fiz. Khim. 35(12): 2727-2735, 1961. 5 refs.

The occurrence of oxygen transfer from nonactive to active centers and back again through surface migration on a carbon black electrode (catalyst) until the establishment of equilibrium was demonstrated. Migration rate was found to increase with temperature. The formula of O. K. Davtyan, which gives the dependence of electrode potential on degree of filling of active centers of the chemisorbed substance, was experimentally substantiated for the case of oxygen chemisorption on a carbon black electrode. This supports the proposition that electrode potential is determined not only by the chemisorbed gas in general, but by the electrochemically or chemically active chemisorbed gas constituting some fraction of the total adsorbed gas. The number of active centers on the carbon black surface was determined by the low-temperature oxidation of SO2. The value found was 3.358 times 10 to the 18th power per sq m, which is in good agreement with the value of 4.107 times 10 to the 18th power per sq m obtained the Daytyan formula. These data also indicate a correlation between chemically and electrochemically active oxygen on carbon black.

4332 APTIC NUMBER 13929

Triaca, W. E. and A. J. Arvia
FORMATION OF A REVERSIBLE CELL IN THE ELECTROLYSIS OF MOLTEN SILVER NITRATE. Electrochim. Acta, vol. 9:919-924, 1964. 6 refs.

In the electrolysis of pure molten silver nitrate with a silver cathode and a platinum anode at temperatures from 220 to 380 C, a reversible cell is formed. When the system is electrolyzed for a short time at a steady current density and then the current is interrupted, it tends to reach after a few seconds, a reversible emf which is independent of the current density employed in the previous electrolysis. This emf is constant provided that the composition of the system is not altered. Short-circuiting the cell repeatedly always leads to the same emf. The emf is related to the residual electrochemical cell formed during the electrolysis. The cell can be represented by the following scheme: Ag/AgNO3(l)/NO2,NO,O2/Pt. The reversible reactions involved in the cell are Ag plus NO2 plus 1/2O2 yields AgNO3 and NO plus 1/2O2 yields NO2. The theoretical decomposition voltage of silver nitrate is coincident with the ones found experimentally, taking account of the actual concentrations of species involved in the reactions. (Author abstract modified)

4333 APTIC NUMBER 13189

Trout, Paul E.
MAGNESIUM-BASE SEMICHEMICAL PULPING FOR CORRUGATING MEDIUM PRODUCTION. Tappi, 51(3):43A-47A, March 1968. 13 refs. (Presented at the 52nd Annual Meeting, Tech. Assoc. of the Pulp and Paper Industry, New York, Feb. 19-23, 1967.)

Studies were conducted to determine if the quality of a corrugating medium made by a commercial magnesium-base semichemical process could be competitive with that made by the regular soda-base neutral sulfite semichemical (NSSC) process. The magnesium-base semichemical liquor was prepared by batch sulfitation of magnesium hydroxide slurry. Cooking of mixed hardwoods was carried out in a conventional continuous digester. Process equipment was severely eroded by the liquors, and it is doubtful that a commercially operable neutral magnesium-base semichemical pulping process can be developed. At the same time, magnesium base pulps were found to require lower chemical ratios, lower cooking temperatures, and shorter cooking times than soda-base NSSC pulps. The magnesium-base pulps and corrugating mediums had lower strength properties than the comparable sodium-base products. However, these differences did not adversely affect corrugated container performance.

4334 APTIC NUMBER 13824

Tseytlin, A. N. and K. Ye. Romanenko
ABSORPTION OF NITROGEN OXIDES BY SULFURIC ACID. (K voprosy ob absorbtsii okislov azota sernoy kislotoy). Text in Russian. Izv. Vysshikh Uchebn. Zavedenii, Khim. i Khim. Tekhnol., 9(1):83-88, 1966. 12 refs.

The dependence of absorption rate on composition of the liquid phase (sulfuric acid monohydrate and NO3 content), temperature, linear gas flow rate, and reflux density was studied. It is shown that as linear gas rate increases, the absorption coefficient increases to some limit, depending upon the composition of the liquid phase, and reaches a maximum near 0.8-1.0 m/sec. Reflux density has negligible effect on the absorption coefficient of nitrogen oxides (with complete surface wetting). Absorption coefficient increases with sulfuric acid concentration only up to 87-88%. Increasing the NO3 content and temperature leads to a reduction in absorption coefficient which limits the nitrosylsulfuric acid content of the final solution. Data presented may be used in designing absorbers. Production of high nitrosylsulfuric acid concentrations requires using sulfuric acid concentrations of at least 80-82%. Sulfuric acid of this concentration can be obtained by the tower process as well as by the contact process.

4335 APTIC NUMBER 13260

Udel'nova, T. M. and Ye. A. Boychenko
REACTION OF MANGANESE WITH LEAF GALACTOLIPIDS. (Soyedineniye margantsa s galaktolipidami list'ev). Text in Russian. Biokhimiya, 32(4):779-785, July-Aug. 1967. 40 refs.

Paper chromatography was used to isolate a complex containing 12% manganese, galactoside diglyceride, and flavin from plants of different metabolism (Trifolium repens, Elodea canadensis, Primula obconica, Brassica oleracea). The complex exhibited unsaturated bonds due to the presence of linoleic acid and has high redox potential. It is proposed that this complex is an oxidizing agent participitating in the release of oxygen during photosynthesis.

4336 APTIC NUMBER 13557

Udy, Marvin J.
IMPROVEMENTS IN SULPHUR RECOVERY. Brit. Pat. 578,136. 4p., June 17, 1946. (Appl. May 6, 1944, 5 claims).

A process for recovering elemental sulfur from gases containing sulfur dioxide and hydrogen sulfide is described. This process is based on a reaction between SO2 and H2S in which water and elemental sulfur are produced. The two gases are reacted in an atmosphere of water vapor maintained over a body of aqueous liquid and at a temperature below the boiling point of water. The water vapor is produced by evaporation of water contained in the aqueous liquid and by water formed in the reaction itself. For best results, pure SO2 and H2S should be used. The SO2 can be produced by oxidizing iron sulfide-bearing material in air, and the H2S, by digesting material containing ferrous sulfide with sulfuric acid or hydrochloric acid.

4337 APTIC NUMBER 13241

Utaka, Giichi, Kyoichi Oku, Hiroshi Matsuura, and Asahi Sakai
BASIC STUDIES ON HARDWOOD TWO-STAGE SULFITE PULPING. BEHAVIOR OF HARDWOOD HEMICELLULOSES DURING COOKING. Tappi, 48(5):273-281, May 1965. 38 refs.

Single-stage and two-stage pulpings of wide pH range were performed on a mixture of beech and oak, the typical Japanese hardwoods. The pulp properties of both full-chemical and high-yield pulps produced by various pulping procedures were compared and discussed. In addition, the hemicelluloses extracted from the original woods and pulps were analyzed to study the behavior of hardwood hemicellulcses under various cooking conditions. The effect of quantity and chemical structure of hemicelluloses on the pulp yield and pulp characteristics, based upon the analysis of hemicelluloses, is discussed. (Author abstract modified)

4338 APTIC NUMBER 13842

Uyehara, O. A. and K. M. Watson
OXIDATION OF SULFUR DIOXIDE. Ind. Eng. Chem., 35(86):541-545, May 1943. 7 refs.

The data of Lewis and Ries on the oxidation of sulfur dioxide in a flow system over a platinized asbestos catalyst were used to evaluate two complete rate equations: one which assumes that the rate-controlling step is a surface reaction between activation-absorbed sulfur dioxide and atomic oxygen, and an alternate form which implies no adsorption of sulfur dioxide. The first equation was found to give slightly better correlation with the experimental data and to represent it as accurately as the espirical equation developed by Lewis and Ries. However, it could not be determined whether the adsorption equilibrium constants and the overall temperature coefficient terms evaluated are roughly applicable to other platinum catalysts for this reaction.

4339 APTIC NUMBER 13437

Villavicencio, Eduardo J., Mario Sierra Rojas, and Salvador Escobar
CONTINUOUS DIGESTING OF CELLULOSIC FIBROUS MATERIAL AT DECREASING PRESSURE WITH MECHANICAL DEFIBERING THEREBETWEEN. (Cia Industrial de Ayotla, S.A.) U. S. Pat. 3,238,088. 5p., March 1, 1966. 7 refs. (Appl. Dec. 4, 1962, 5 claims.)

A novel process for the continuous production of high-grade pulp from sugar cane bagasse is described. The bagasse is subjected to an initial softening and chemical impregnation step in a saturated steam zone at 366 F and 150 psig. It is then mechanically defibrated at the same temperature and pressure. This is followed by continued exposure to steam at 358 F and 135 psig to complete the refining and cooking of the pulp. The process allows lower temperatures and pressures to be used, which results in a stronger and lighter product. The continuous nature of the process yields a high-grade pulp with a 90% reduction in the quantity of chemicals required for separating the lignin and other non-cellulosic materials from the fiber.

4340 APTIC NUMBER 13655

Vlasov, A. Ya., G. V. Kovalenko, and V. A. Chikhachev
TEMPERATURE PHASE AND MAGNETIC CONVERSIONS OF IRON HYDROXIDE. (Temperaturnyye fazovyye i magnitnyye prevrashcheniya gidrookisi zheleza). Text in Russian. Izv. Akad. Nauk SSSP, Fizika Zemli, no. 10:63-70, 1967. 7 refs.

Studies of the process of temperature phase conversion of iron(III) hydroxide in hematite reveal a dependence on the formation conditions of the starting product. Hydroxide formed in acid medium undergoes temperature phase conversion at 300-400 C, while that formed in alkaline medium undergoes conversion at 250-300 C. The original hydroxide is in a supermagnetic state which disappears during dehydration to hematite.

magnetization present at the end of dehydration is oriented in the direction of the earth's magnetic field. Hence, hematite deposits are suitable for paleomagnetic studies only if their chemical alteration can be accurately dated.

4341 APTIC NUMBER 13677

Vydra, F. and J. Galba
SORPTION OF METAL COMPLEXES ON SILICA GEL. III. SORPTION OF HYDROLYSIS PRODUCTS OF TH(IV), FE(III), AL(III) AND CR(III). (Sorption von Metallkomplexen an Silicagel III. Sorption von Hydrolysenprodukten des TH(IV), FE(III), AL(III) und CR(III)). Text in German. Coll. Czech. Chem. Commun., 32(10):3530-3536, 1967. 18 refs.

The sorption of Th(IV), Fe(III), Al(III), and Cr(III) was studied on silica gel under static conditions at pH values at which these metal ion hydroxy complexes occasionally form soluble colloidal hydroxides. For this purpose, 25 ml 0.01 M metal ion solution were intensely shaken for 2 hours with 2 mg silica gel. The silica gel was removed afterwards with dry filter paper. The amount of sorbed metal complexes was determined by titration. The results of the experiments showed that the sorption capacity of the silica gel increases in all cases with the change of the pH value, i.e., between 0.00001 and 0.0001 moles/g silica gel. The tests were performed with pH values at which no solid precipitated. Although sorption of thorium started at pH 1.5, the liberated hydrogen ions could be determined only at pH 3.75. Aluminum is sorbed under static conditions at a pH of about 2.5 and behaves like a complex with two positive charges. Formic acid solutions of iron were sorbed at lower pH than acetic acid solutions. In the sorption of chromium on silica gel at pH 3.87 to 6.04, no hydrogen ions were liberated, which proves that at such pH, chromium is sorbed as colloidal chromium(III) hydroxide particles or other chromium compounds of limited solubility.

4342 APTIC NUMBER 13589

Warner, N. A. and T. P. Ingraham
KINETIC STUDIES OF THE THERMAL DECOMPOSITION OF FERRIC SULPHATE AND ALUMINUM SULPHATE. Can. J. Chem. Eng., No. 107:263-267, Dec. 1962. 12 refs.

Experiments conducted on the rates of thermal decomposition of ferric sulfate and aluminum sulfate have shown that it is possible to make kinetic studies using finely divided powders. The powders were compressed into a cylindrical form and mathematical corrections were made for the change in interfacial area which results as the reaction proceeds. It has been shown that the rate of decomposition of ferric sulfate is much more rapid than that of aluminum sulfate. Because of the large difference in activation energies of the reactions, the difference in reaction rates is greatest at low temperatures. It has also been shown that the rate of decomposition of ferric sulfate varies with the driving force, when this force is defined as the difference between the equilibrium pressure of SO2 over the sample and the partial pressure of SO2 in the sweeping gas. The same relationship can be applied to the partial pressure of oxygen, but it does not hold for SO3 present in the gas. (Authors' summary modified)

4343 APTIC NUMBER 13136

Waurick, Ursula, Wolfgang Matzel, and Peter Kund
TRACE ELEMENTS IN INDUSTRIAL REFUSE. (Spurenelemente in industriellen Abfallstoffen). Text in German. Chem. Tech. (Berlin), 21(1):43-45, Jan. 1969.

To determine the commercial value of such waste products as dust, slag, and ash as fertilizer, B, Mn, Cu, Zn, Co, and Ge were analytically determined. Boron was determined by the carminic acid method of Hatcher and Wilcox. Manganese was determined by the method of Alten and Weiland, which is based on the oxidation of manganese (II) with ammonium persulfate. The permanganate which developed was photometrically measured. Copper, Zn, and Co were treated with hydrochloric acid and Cu was separated with lead diethyldithiccarbamate, Zn was separated with dithizone, and Co was separated as pink beta-nitroso-alpha-naphtol complex. Subsequently these substances were photometrically determined. Six types of soft coal ashes, 6 fly dusts from cement kilns, and 3 slags from open hearth furnaces were analyzed. Among the results, the high boron concentration of soft coal ash (up to 1000 ppm) was striking. If such an ash is used for chalking of acid soils, about 5 to 10 tons are required per hectare to have a positive effect. The slag from the open hearth furnace had a high manganese concentration (up to 6.3%).

4344 APTIC NUMBER 13034

Weaver, E.E., J.S. Ninomiya, L.M. Skewes, and C.H. Ruof
OXIDATION OF GASEOUS HYDROCARBONS IN CONCENTRATIONS OF PARTS PER MILLION IN FLOW SYSTEMS. OXIDATION OF 1-BUTENE IN TYPE 410 STAINLESS STEEL TUBES. Environ. Sci. Technol., 3(1):57-62, Jan. 1969. 6 refs.

1-Butene was oxidized in concentrations of 7 to 350 ppm in 90% nitrogen-10% oxygen blends flowing laminarly in fresh and aged Type 410 stainless steel tubes with residence times of 0.10 to 0.25 sec at temperatures between 450 and 800 C. In the fresh tubes, the reaction appears to be largely homogeneous, since nearly identical oxidation rates are obtained in tubes of different diameters and hence of different surface-volume ratios. However, on prolonged use the tubes become increasingly catalytic, showing an order of magnitude increase in rates of oxidation; simultaneously, the surface area of the tube increases by an order of magnitude as shown by BET measurements. The rates of disappearance of the 1-butene approach first-order with respect to hydrocarbon concentration as the tubes are aged; they become independent of oxygen concentration when about 20 times the

stoichiometric amount of oxygen is present. (Author abstract modified)

4345 APTIC NUMBER 13600

Weeks, Edward J.
THE ACTION OF SULPHUR DIOXIDE ON CALCIUM CARBONATE. Chem. News, Vol. 143, p. 50, July 24, 1931.

The well-known decay of limestone by atmospheric sulfur dioxide with the formation of calcium sulfate prompted an investigation of the reactions between sulfur dioxide and calcium carbonate. These reactions were determined as follows: CaCO3 plus SO2 yields CaSO3 plus CO2; 2CaSO3 plus SO2 yields 2CaSO4 plus S; and 2CaCO3 plus 3SO2 yields 2CaSO4 plus 2CO2 plus S.

4346 APTIC NUMBER 13480

Wenzl, Herman F. J. and O. V. Ingruber
INFLUENCE OF COOKING LIQUOR ON WOOD COMPONENTS IN KRAFT PULPING. Paper Trade J., 150(33):44-49, Aug. 15, 1966. 44 refs.

Investigations of the reaction kinetics of kraft delignification ar reviewed, with special emphasis on studies of the nature of the lignin, hemicellulose, and cellulose components and their decomposition products. Acid, soda, and alkali cooks are considere and the effects of different chemicals on the components are relate to commercial cooking processes. Studies have not as yet determine whether sodium sulfide, sodium hydrosulfide, or hydrogen sulfide ar involved in thiolignin reactions. In general, softwood lignins are more easily deactivated by alkali than are hardwoods, whose activation energy of delignification decreases with increasing sulfide concentration. Contrary to the general assumption that delignification in alkaline medium is a first-order reaction, Kleinert and Marraccini have shown that alkaline cooking leads to the formation of macromolecular fragment complexes and to the formation and exposure of free radicals. Delignification is divide into two reaction sequences, bulk and residual, each having differe rate constants. Christiansen and Legg (TAPPI, 41(5):216, 1958) hav suggested that pulp quality and delignification rate decrease at alkali concentrations below 15 g/l of Na2O. According to Regnfors and Stockman (SVENSK PAPPERSTID, 59(14):509, 1969), less than half the sulfide in the cooking liquor is consumed in the formation of thiolignins. Since lignin, hemicellulose, and cellulose are associated in wood, it is difficult to remove one component without modifying or partially removing the others. Any modification causi the retention of a large portion of hemicellulose influences the yield and properties of the pulp.

4347 APTIC NUMBER 13343

Wenzl, Herman F. J. and O. V. Ingruber
WOOD STRUCTURE AND MOVEMENT OF COOKING LIQUORS IN THE WOOD DURING KRAFT PULPING. Paper Trade J., 150(36):28-31, Sept. 5, 1966. 40 refs.

The microscopic properties of cellulose are known to be strongly influenced by the effect of alkaline solutions on its crystal structure, so it is not surprising that the uneven crystalline structure of wood is further influenced in kraft cooks. However, the solution of various wood components is largely independent of the physical structure of the wood. Pulp properties depend mainly on morpholcgical characteristics and the basic strength of the fibers. Cell wall thickness is an important influence on beating behavior of pulps, while lumen width and fiber diameter affect density, tensile, and bursting strengths. Retention of large amounts of noncellulosic components makes some pulps more resistant to beating. The mechanism by which liquid penetrates wood is complicated due to the variety of movements and forces involved, in addition to the complex capillary structure of wood. The tracheidal fibers of softwoods are more effective in aiding penetration than the ray cells of hardwoods. The penetration of dissolved substances into the wood structure is of special importance in pulping, and liquids possessing swelling properties penetrate wood more rapidly than nonswelling liquids. The permeability by liquids which react chemically with one or more components of the wood shows a strong dependence on time and temperature. The desired isolation of cellulose is an extraction process connected with a chemical reaction of the extraction medium with the substances accompanying the cellulose. Solvents and reagents need to penetrate the capillary structure to reach the cell walls. This penetration occurs in a more or less rapid initial stage through water vapor diffusion and condensation and is followed by capillary rise. In the second stage, final diffusion into the cell walls and swelling occurs.

4348 APTIC NUMBER 12804

Wessel, Josef and Joerg Hermann
EXPERIMENTAL PRODUCTION OF NARROW PARTICLE BANDS BY AIR CLASSIFICATION. Staub (English Translation), 28(10):20-24, Oct. 1968. 9 refs.
CFSTI TT 68-50448/10

The behavior of granular solids is determined, amongst other factor by particle size distribution. An attempt was made to bring about an approximation of monodisperse granulations by sufficiently narrow particle fractions with the sharpest possible limits towards the coarse and fine range. The results of this study reveal that, by using suitable air separators it is possible, without intricate arrangements, to divide a particle size into many relatively sharply defined fractions. The fractions obtained are within the following ranges: 15-40, 40-70, 70-100, 100-150 and 150-250 micrometers. They differ considerably from the original particle size as regards the falling capacity, bulk density and tendency to agglomeration.

4349 APTIC NUMBER 13465

Wicke, Alfred F., Henry E. McLaughlin, and Joseph H. Stump, Jr.
PROCESSES FOR REMOVING STILBENE FROM TALL OIL FATTY ACIDS.

(Tenneco Chemicals, Inc., Delaware) U. S. Pat. 3,257,438. 4p., June 21, 1966. 11 refs. (Appl. May 18, 1962, 5 claims.)

The process utilizes catalytic amounts of boron trifluoride to convert a major portion of the stilbene compounds in tall oil fatty acids to higher-boiling derivatives. The catalyst is removed and the treated fatty acids are distilled. The reactions occur readily at room temperature, but the process is successful up to 100 C. Tall oil fatty acids containing 0.1% or more stilbene can be treated to obtain a product containing less than 0.04% stilbene.

4350 APTIC NUMBER 13012

Wilder, Harry D. and Edward J. Daleski, Jr.
KRAFT PULPING KINETICS. I. LITERATURE REVIEW AND RESEARCH PROGRAM. Tappi, 47(5):270-275, May 1964. 37 refs.

A quantitative description of the rates of removal of the various wood components during alkaline pulping is important to any attempt at design and control of commercial digesters. The complex physical and chemical structure of wood, coupled with our lack of understanding of liquor equilibria, make such a description rather difficult. This review is the first step in a program designed to provide this quantitative description. The literature is reviewed in terms of the five steps normally important in heterogeneous reaction systems. It is concluded that the effects of the two transport steps are negligible under commercial conditions when chips of 2-mm thickness or less are employed and when the liquor alkali is not depleted. When transport is important, a diffusion model probably can account for the observed pulp nonuniformities. The moving interface model of Nolan is but a limiting case of the diffusion model. Sorption and desorption steps do occur, but their importance is not understood. The chemical reaction step is most important. Sulfide and hydroxide act directly during delignification, but their roles in carbohydrate removal are much less clear. Delignification rate is relatable to temperature through the Arrhenius equation. Apparently, delignification by alkaline solutions need not be considered as a lignin surface reaction; lignin is an amorphous material and is accessible to alkaline reactants. Consumption of alkali is probably related to the extent of carbohydrate removal, while sulfide consumption is a function of degree of delignification. (Author abstract modified)

4351 APTIC NUMBER 13884

Willard, Hobart H. and Lucien Greathouse
THE COLORIMETRIC DETERMINATION OF MANGANESE BY OXIDATION WITH PERIODATE. J. Am. Chem. Soc., vol. 39:2366-2377, 1917. 34 refs.

The periodates of the alkali metals are excellent reagents for the oxidation of manganese to permanganate in the colorimetric estimation of this element. The oxidation with a small excess of permanganate is certain and complete, providing sufficient free acid is present to prevent the precipitation of manganic periodates or oxides. This oxidation is more reliable than that with persulfate and silver nitrate, and it gives the true permanganate color. A high concentration of acid, the presence of ammonium salts, and prolonging the time of heating are all without effect. Traces of chloride do not interfere and even larger amounts may be expelled by heating with an excess of the reagent. Of the common metals none interferes, unless it forms a colored ion. Reducing agents must be removed by suitable means, such as treatment with nitric acid. If much iron is present, either sulfuric or phosphoric acid must be present to prevent the precipitation of ferric periodate. Phosphoric acid also serves to remove the yellow color of ferric salts. These acids, especially phosphoric, are also more efficient in preventing the precipitation of manganese compounds. Excellent results were obtained by applying this method to analyzed steels and iron ores, and the processes used are described. Attempts to use this as the basis of a volumetric method were unsuccessful. (Author summary modified)

4352 APTIC NUMBER 13146

Wilmore, Jack H.
A SIMPLIFIED METHOD FOR DETERMINATION OF RESIDUAL LUNG VOLUMES. J. Appl. Physiol., 27(1):96-100, July 1969. 16 refs.

An attempt was made to develop a method for obtaining an indirect estimate of residual lung volume which is valid and reproducible and which minimizes the time needed for duplicate determinations on a single subject. The proposed method is basically a modification of the closed-circuit oxygen-dilution method reported by Lundsgaard and Van Slyke (J. Exptl. Med. 27:65-85, 1918). It was compared with the open-circuit method on a sample of 20 normal and healthy subjects with a resulting intercorrelation of r = 0.958 and a mean difference of only 26 ml. The reproducibility of this method was established on a sample of 195 males with a test-retest correlation of 0.993 and a standard error of measurement of 28 ml, and on a sample of 102 females with a correlation of 0.987 and a standard error of measurement of 30 ml. The proposed method, in addition to having a high degree of validity and reproducibility, provides a duplicate determination of the residual volume for any one subject within approximately 8-10 min, representing a two- to sixfold reduction in the total testing time when compared with existing methods. (Author abstract modified)

4353 APTIC NUMBER 13295

Windle, J. J. and L. E. Sacks
ELECTRON PARAMAGNETIC RESONANCE OF MANGANESE(II) AND COPPER (II) IN SPORES. Biochim. Biophys. Acta, 66(4):173-179, April 1963. 29 refs.

Paramagnetic resonance of manganese and copper was observed in a number of different bacterial spores. The manganese spectra are different from those of corresponding vegetative cells and most

other plant materials which have been investigated. The spectra consist of a single broad curve 460-510 Gauss wide with a sextet hyperfine pattern superimposed. Upon germination or autoclaving of Bacillus megaterium spores, most of the manganese is released and the residual cellular matter exhibits only the small sextet hyperfine spectrum. It is concluded that manganese in these spores is bonded in at least two different ways. The implications of the results of electron paramagnetic resonance (EPR) on the hypothesis of a metal-dipicolinic acid complex is considered. The EPR spectrum for copper in spores is consistent with bonding of copper to protein. Lyophilized clean spores do not exhibit a free-radical spectrum on prolonged storage in air. (Author abstract modified)

4354 APTIC NUMBER 13390

Wippermann, F.
DISTRIBUTION OF CONCENTRATION FLUCTUATIONS OF A NOXIOUS GAS DIFFUSING IN THE ATMOSPHERE. (Ueber die Verteilung der Konzentrationsschwankungen eines sich in der Atmosphaere ausbreitenden Schadgases.) Text in German. Z. Meteorol., 20(1-6):1-10, 1968. 10 refs.

Continuing work is reported on the analytical description of the space distribution of gas diffusing from one or several point-like emission sources. It was found that the statistical distribution of concentration fluctuations is of the Poisson type, if the concentration values are expressed in units of a reducing concentration. The method of calculating the latter is described. A direct relationship between the parameters of the statistical distribution and those of the gas diffusion process provides the means to predict the statistical distribution when one or more emission sources are simultaneously present. Know ledge of the statistical distribution enables one to predict the ratio of peak to mean concentrations under given diffusion conditions. A comparison of theoretically computed and experimentally determined ratios was possible in only two cases due to a lack of sufficiently complete experimental data. It is shown that the emission characteristics incorporated in the official anti-air pollution regulations are determined soley by the mean of the statical distribution of concentration fluctuations, as long as it is of the Poisson type.

4355 APTIC NUMBER 13682

Wolfkovich, S. I. and F. G. Margolis
CATALYSIS IN REDUCING POTASSIUM AND SODIUM SULPHATES FROM CHLORIDES DECOMPOSED WITH SULPHUR DIOXIDE IN THE PRESENCE OF OXYGEN. Dokl. Akad. Nauk SSSR, 41(1):21-23, 1943. 7 refs.

Catalysts containing ferric oxide greatly accelerated the electric-furnace production of potassium sulfate for use as a fertilizer in a process following the equations: SO2 plus O yields SO3 and SO3 plus H2O plus 2KCl yields K2SO4 plus 2HCl. Of the catalysts investigated, the most favorable results were obtained with pyritic scoria, a refuse of sulfuric acid manufacture. In the optimum experiments, the electric furnace was charged with a mixture of finely ground KCl with 1% scoria. The SO2 content of the air mixture was 5.5 to 6.5% and the temperature of the reaction was maintained at 520 to 550 C. Potassium sulfate recovery was 95 to 96%. Models of periodical and continuous reaction apparatus will continue to be tested to solve equipment problems. It is hoped to achieve a modification of the process, distinguished by the absence of water vapor, according to the equation: 2KCl plus SO2 plus O2 yields K2SO4 plus Cl2.

4356 APTIC NUMBER 13301

Woodfin, R. C., Jr.
TREATING AND HARVESTING INTERVAL FOR DEBARKING PONDEROSA PINE PULPWOOD WITH SODIUM ARSENITE. Tappi, 46(2):73-75, Feb. 1963. 5 refs.

Chemical debarking was evaluated on Black Hills ponderosa pine trees after 40% sodium arsenite and varicus treating and harvesting intervals were used. Successful debarking was possible throughout the year, except when wood and bark were frozen, provided the interval between treating and peeling was extended over at least one growing season. For example, trees treated between April and early July were successfully debarked in 4 to 6 months; winter-treated trees (September to February) were successfully debarked after a 7 to 12-month interval. Chemically debarked wood averaged 33% less weight per cord than green untreated wood. Insect damage and stain were not a problem even on trees left standing as long as 17 months. Killing of trees adjacent to treated trees due to translocation of sodium arsenite through root grafts was confined to trees that appeared to have a common root system. (Author abstract)

4357 APTIC NUMBER 13675

Woodriff, Ray, Donald W. Stone, and Andrew E. Held
ELECTROTHERMAL ATOMIZATION FOR ATOMIC ABSORPTION ANALYSIS. Appl. Spectry., 22(5):408-411, Sept./Oct. 1968. 12 refs.

In recent years, atomic absorption in flames has been extensively applied to the analysis of both industrial and geological materials. A new spectrochemical procedure which uses electrothermal atomization in a graphite tube furnace promises to have applications for chemical studies of air, water, and earth. The furnace provides an inert, nonturbulent, slow-moving atmosphere with a controllable uniform temperature. Since the gas stream in the furnace is at a lower temperature than the walls, suspended particles are forced to the center where they evaporate and pass on into the light beam. The difference in temperatures also tends to minimize or eliminate memory effects and matrix effects. The operation of the furnace is described and results are given for the analysis of samples of Ag, Cd, Zn, Pb, Li, Cu, Mn, Mo, Fe, Al, Ni, Dy, Ho, Er, and Ca. It is suggested that improvement in design will make the high-temperature furnace more accurate and sensitive than flames or arcs. (Author abstract modified)

4358

APTIC NUMBER 13251

Woolfolk, C. A. and E. R. Stadtman
REGULATION OF GLUTAMINE SYNTHETASE. III. CUMULATIVE FEEDBACK INHIBITION OF GLUTAMINE SYNTHETASE FROM ESCHERICHIA COLI. Arch. Biochem. Biophys., 118(3):736-755, March 1967. 37 refs.

The glutamine synthetase of E. coli was examined for its susceptibility to inhibition by a large number of nitrogen-containing compounds of biological importance. Eight of the compounds tested caused inhibition of the enzyme: alanine, glycine, histidine, tryptophan, CTP, AMP, carbamyl phosphate, and glucosamine-6-phosphate. At high concentrations, each compound causes only partial inhibition. When mixtures of the inhibitors are present at nearly saturating concentrations, their effects are cumulative. Thus, collectively they can cause almost complete inhibition of the enzyme. The results suggest that the enzyme possesses separate binding sites for each of the eight inhibitors and that there is no significant interaction between these binding sites. This suggestion is further supported by kinetic studies showing that three of the inhibitors are noncompetitive with respect to any substrate, three are partially competitive with respect to glutamate, and two are partially competitive with respect to ammonia. Moreover, the inhibitory responses to different inhibitors are differentially effected by $Mg(2+)$ and $Mn(2+)$, one or the other of which is required for glutamine synthetase activity. Finally, the occurrence of separate binding sites for each inhibitor is indicated by the selective sensitization or desensitization of the enzyme to inhibition by particular inhibitors as a result of structural modification induced by aging, or treatment with urea, or acetone. (Author abstract modified)

4359

APTIC NUMBER 13304

Norwood, M., D. M. Taylor, and A. H. Hunt
COPPER AND MANGANESE CONCENTRATIONS IN BILIARY CIRRHOSIS OF LIVER. Brit. Med. J., vol. 3:344-346, Aug. 10, 1968. 20 refs.

The presence of large amounts of copper in the liver in primary biliary cirrhosis was confirmed. A similar increase is not found in cases of long-standing extrahepatic biliary obstruction. The serum ceruloplasmin levels are raised in primary and secondary biliary cirrhosis, but this increase does not appear to be related to the degree of increase of hepatic copper. The manganese content of the liver is slightly raised in both these conditions. The reason for the increased metal content in these circumstances cannot yet be determined, and the effects are not yet understood. (Author summary modified)

4360

APTIC NUMBER 13309

Young, A. C., G. Brandt, P. H. Brand, and C. J. Martin
CALIBRATION OF RAPID GAS ANALYZERS WITH A MIXING CHAMBER. J. Appl. Physiol., 27(1):112-114, July 1969. 2 refs.

An almost ideal calibrator was developed for the calibration of gas meters for respiratory work. It supplies an infinite number of gas concentrations from a minimum number of gas bottles, eliminating the need for multiple reference gases, and also humidifies the test gases at 37 C. By mixing two gases at the limits of the concentration range, a continuum of values is obtained. Calibrating gas from one of two outside chambers is pulled into the mixing chamber by the vacuum of the gas analyzer being tested. Inside the mixing chamber, gases are thoroughly mixed at controlled temperatures by a small (1800 rpm fan) located in the base. Condensation can be avoided when humidified gases are used. Equations for plotting washin and washout calibration curves of a nitrogen analyzer exemplify the system.

4361

APTIC NUMBER 13321

Zaruba, F., M. A. Karasek, and E. H. Farber
ISOLATION AND PROPERTIES OF A PHOSPHODIESTERASE FROM NEWBORN MOUSE SKIN. J. Invest. Dermatol., 49(5):537-543, Nov. 1967. 7 refs.

Exonucleases (enzymes that hydrolyze nucleic acids from the terminal positions) have not previously been shown to be present in skin tissue. This article reports on the purification and properties of thymidine 5'-phosphodiesterase from normal newborn mouse skin. A fluorogenic substrate, thymidine 5'-3-O-methoxy fluorescein, was employed for fluorometric studies of the physical properties of the enzyme. A sharp pH optimum of 8.5 was observed for the phosphodiesterase, and a disulfide linkage appears to be required for enzyme activity since both cysteine and dimercaptopropanol inhibit enzyme activity. Iodoacetic acid was without effect. Either manganous ions or magnesium ions activate the enzyme as is characteristic for most phosphodiesterases. The enzyme is strongly inhibited by molybdate ions. The enzyme is also found in tissues with a characteristically high turnover rate. Intestinal epithelium and skin contain the highest levels of activity on a wet-weight basis while brain and muscle contain greatly reduced amounts of enzyme. Thymidine 5'-phosphodiesterase would appear to be useful for studies in skin and blood of patients with skin diseases characterized by a rapid cellular turnover.

4362

APTIC NUMBER 13225

Zawadzki, J.
ON THE SYSTEM CALCIUM-SULFUR-OXYGEN. (Zur Kenntnis des Systems Calcium-Schwefel-Sauerstoff). Text in German. Z. Anorg. Allgem. Chem., vol. 205:180-192, 1932. 38 refs.

The decomposition tension of dehydrated gypsum is not a true equilibrium tension. During continuous heating of gypsum at constant temperature, the tension drops until it reaches the decomposition tension of anhydrite. Correspondingly, the reaction heat computed with the Nernst formula increases with temperature. Equilibrium is only maintained if the ratio of SO2 to O2 in the gas phase is 2:1. Different decomposition tensions

are observed for the two modifications of CaSO4 which were found in this research. The first is dehydrated gypsum which changes to anhydrite; the other is a modification. This change is a rapid one at 1200 C, but the phase change point must be lower, since the reverse change was not observed. Gypsum decomposes at much lower temperatures if oxygen is removed. Almost no CaSO3 arises, but CaS and CaO are formed. At higher temperatures CaO, SO2, and S2 are formed. If SO2 is passed over CaO at 500 C, CaSO3 is formed, while at higher temperatures, CaS and CaSO4 are formed. At 1150 C, CaSO4 and S2 are formed. The static pressure method used gives only the total pressure, while the partial pressures can be determined with a flow method. Here the ratios of gas constituents are determined analytically. The reaction heat of the reaction CaS + 3 CaSO4 yields 4 CaO + 4 SO2 was -233.9 kcal/mole; the reaction heat of CaS + 2 SO2 yields CaSO4 + S2 was 55 kcal/mole. From the measured partial pressures, the dissociation constant of SO2 was found to be given by log K4 = 8.54, which agrees well with that of Lewis and Randall.

4363 APTIC NUMBER 13859

Ziesse, H. G. and G. W. Penney
THE EFFECTS OF CIGARETTE SMOKE ON SPACE CHARGE SOILING OF WALLS WHEN AIR IS CLEANED BY A CHARGING-TYPE ELECTROSTATIC PRECIPITATOR. ASHRAE (Am. Soc. Heating Refrig. Aircond. Engrs.) Trans., vol. 74, pt. 2:104-114, 1968. 3 refs. (Presented at the ASHRAE Annual Meeting, Lake Placid, N. Y., June 24-26, 1968.)

If airborne particles are not entirely removed by an electrostatic precipitator, a space charge condition can be created in a room which drives the charged particles to the enclosing walls. To determine the effects of this charge on wall soiling by normal particulates, laboratory measurements were made of the charge carried by cigarette smoke after passing through a precipitator with an ionizer and HEPTA filters. Measurements were conducted under two extremes of smoking conditions: (1) quiescent burning with no air drawn through the cigarette and (2) with the cigarette smoked rapidly. The total charges collected under the two conditions were considered approximately equal. These measurements, together with those of the charge-removal efficiency of the precipitater's ion collection plates, were used to derive equations for calculating (1) steady-state charge density in a room; (2) the relationship of charge density to precipitator, ventilation and smoking rate; and (3) curves of soiling vs air cleaner dust spot efficiency. The calculations neglect smoke deposition as a contribution to wall soiling and consider only the effect of increased space charge on the deposition of normal particulates. A discussion by John R. Swanton, Donald F. Owens, and S. P. Solimo is appended.

4364

APTIC NUMBER 12652

E. E. Albert, J. P. Spiegelman, S. Shatsky, M. Lippmann
THE EFFECT OF ACUTE EXPOSURE TO CIGARETTE SMOKE ON BRONCHIAL CLEARANCE IN THE MINIATURE DONKEY. Arch. Environ. Health, 18(1):30-41, Jan. 1969.

This study describes the effect of cigarette smoking on the bronchial clearance of monodisperse radioactive iron oxide particles in the miniature donkey. Five donkeys were used to study the effect of 18 to 36 cigarettes smoked over a period of one to two hours. The smoke was inhaled through nasal catheters, either directly or through a water trap. Direct exposure to cigarette smoke produced increased amounts of clearance (i.e., greater bronchial deposition) and slower clearance rates from both the bronchial tree and the trachea. The water trap, which increased the transit time of the smoke from the cigarette to the lung and probably absorbed water-soluble gases, reversed some of the impairment of clearance, particularly in the trachea, which was produced by cigarette smoking. (Author's Abstract)##

4365

APTIC NUMBER 13446

Anbar, M. and M. Inbar
THE EFFECT OF CERTAIN METALLIC CATIONS ON THE IODIDE UPTAKE IN THE THYROID GLAND OF MICE. Acta Endocrincl. (Kobenhaven), 46:643-652, Aug. 1964. 21 refs.

It has been reported that certain metal ions interfere with the iodine uptake in the thyroid. The effect of various metallic cations on the iodine uptake into the gland was studied. Ten experimental mice were used for each material to be examined. The metallic cations to be tested were administered in isotope form and traced by a radioactive tracer. The iodine uptake was calculated in terms of % of injected dose accumulated in the gland or as a concentration ratio. Ferric, cupric, mercuric, zinc, cadmium, and nickel ions at the dose level of 0.1 millimoles per kg body weight were found to decrease the uptake of iodine in the thyroid gland. Manganous ions exhibited a similar effect when the dose was doubled. A parallel decrease in fluoroborate could be demonstrated. This suggests an interference at the stage of iodide accumulation. Cobaltous, cobaltic, magnesium, beryllium, and zirconium ions were shown to have not effect on iodine uptake at the same dose level. The extent of influence upon thyroxine production was discussed.

4366

APTIC NUMBER 13120

Ayres, Stephen M.
THE EFFECTS OF AIR POLLUTION OF HEALTH. Delaware Med. J., 41(1): 9-16, Jan. 1969.

Three chronic lung diseases may either be caused or aggravated by exposure to polluted air. Bronchial asthma is caused by inhalation of certain particles such as plant pollens which produce an allergic reaction and lead to bronchial constriction. Chronic bronchitis results from constant irritation of the tracheobronchial tree with destruction of cilia and production of mucus. Chronic obstructive emphysema usually follows many years of chronic bronchitis. Correlation studies have been made relating daily air pollution concentrations and number of hospital emergency room patients having respiratory difficulty. Consistent correlation was observed, with the closest relationship occurring between respiratory illness and particulate concentration three days earlier, suggesting a lag period before the development of pulmonary symptomatology. Air pollution episodes in the Meuse River Valley, Donora, London, and New York City are reviewed. Physiological studies have shown that 0.2 ppm of SO2 can result in airway resistance, and exposure to 50 ppm of carbon monoxide leads to inactivation of 5% of the toal body hemoglobin.

4367

APTIC NUMBER 13700

Balazova, G., P. Macuch, and A. Nippel
EFFECTS OF FLUORINE EMISSIONS ON THE LIVING ORGANISM. Fluoride Quarterly, J. Intern. Soc. Fluoride Res., 2(1):33-36, Jan. 1969.

Health parameters were measured in children living in an area near an aluminum factory. In the area near the factory, excessively high F levels were found in the air and in dust. This fact was reflected in high F levels of agricultural products. High F levels were noted in urine, hair, nails, and teeth in the child population residing in the immediate vicinity of the factory. In children living in the exposed area since birth, hemoglobin values were lower and erythrocyte values were higher than in a control area. The average daily total F intake was calculated at 2.15 mg for the exposed children as compared with about 1 mg in the controls. (Author summary modified)

4368

APTIC NUMBER 12575

Beilin, H.
PHAGOCYTOSIS OF INHALED PLUTONIUM OXIDE--239PU PARTICLES BY PULMONARY MACROPHAGES. Science, 162(3856):918-920, Nov. 22, 1968. 11 refs.

Pulmonary macrophages and plutonium particles were removed by washing the lungs of rats that had inhaled PuO2-239Pu. A significant amount of Pu was found in multiple washings of the same lung. The removal of toxic particles by washing is of potential therapeutic value. Particles were phagocytized by macrophages during the first 3 hr and retained within these cells for up to 25 days. Nearly all particles in washings were found in macrophages after the second day. The percent of macrophages with engulfed particles increased with increasing amounts of Pu deposited in the lungs. The ability of pulmonary macrophages to rapidly phagocytize and retain Pu particles deposited in the lungs has been shown. (Author's Abstract)##

Preceding page blank

4369 APTIC NUMBER 12653

M. H. Berlin, G. F. Nordberg, F. Serenius
ON THE SITE AND MECHANISM OF MERCURY VAPOR RESORPTION IN THE LUNG. A STUDY IN THE GUINEA PIG USING MERCURIC NITRATE Hg2O3. Arch. Environ. Health, 18(1):42-50, Jan. 1969.

The percentage of whole-body mercury found in the lungs of guinea pigs exposed to mercury vapor for ten minutes was in the same range as after one hour's exposure (25% to 33%). The highest concentrations of mercury were found in peripheral lung structures. The same distribution was found at different concentrations of mercury in the air. Only one tenth of the values were found in corresponding structures of animals injected with mercuric nitrate. Most of the mercury deposited in alveolar tissues is therfore probably deposited there directly from the air. The results are considered to indicate the following: That mercury vapor penetrates to the alveoli; that most of it is quickly transferred to the blood; and that a small fraction is deposited in the pulmonary tissues, from where it is slowly eliminated to the rest of the body. (Author's Abstract)##

4370 APTIC NUMBER 13126

Boudik, F., F. Herles, V. Teichman, F. Machelda, et al.
THE FREQUENCY OF CHRONIC BRONCHITIS IN A TOWN DISTRICT. SOME DATA FROM EPIDEMICLOGICAL STUDIES OF CHRONIC BRONCHITIS AND COR PULMONALE IN PRAGUE 2. (Vyskyt chronicke bronchitidy v mestskem obvoduchronicke bronchitidy a cor pulmonale v Praze 2). Text in Czech. Casopis Lekaru Ceskych (Prague), 108(1):12-19, 1969. 30 refs.

Results are presented of epidemiological studies undertaken in district 2 of Prague to test the frequency of chronic bronchitis and cor pulmonale among 8292 males born between 1898 and 1913. Chronic bronchitis was found in 31.77% of the subjects. A higher frequency of respiratory symptoms was found among cigarette smokers as compared to non-smokers. These results were confirmed by ventilation data. A higher frequency of respiratory symptoms was also found among individuals who changed occupation from the class of intellectual occupations to that of manual occupations.

4371 APTIC NUMBER 13650

Brakhnova, I. T. and E. D. Bakalinskaya
HYGIENIC ESTIMATION OF AEROSOLS OF METALS, FORMED DURING PRODUCTION OF CERMET ARTICLES ON THE BASE OF COPPER AND IRON. (Gigiyenicheskaya otenska aerozoley metallov, obrazuyushchikhsya pri izgotovlenii metallokeramicheskikh izdeliy na osnove medi i zheleza). Text in Russian. Poroshkovaya met., 7(3):105-108, 1967. 9 refs.

The effects of copper- and iron-based aerosols from the manufacture of cermets were studied in animals both by inhalation and by direct introduction into the trachea. The metal aerosols exhibited a fibrogenic and generally toxic effect, which depended on the quantity and nature of the components. Aerosols of lighter metals most frequently caused bronchopneumonia, while reduced iron dust caused weak sclerotic changes in lung tissue. Maximum permissible concentrations in work areas are recommended for the following dusts: copper, copper mixtures (Cu, C, Sn, and/or Ni), iron, iron mixtures (Fe, C, Ni), Mg-Mn and Mn-Zn ferrites, and Ni-Zn ferrites.

4372 APTIC NUMBER 13952

Buckley, Rasco D. and Clayton G. Loosli
EFFECTS OF NITROGEN DIOXIDE INHALATION ON GERMFREE MOUSE LUNG. Arch. Environ. Health, 18(4):588-595, April 1969. 16 refs.

The role of nitrogen dioxide (NO_2) alone as a causative agent of structural and metabolic alteration to lung tissue, without the synergistic effects of superimposed bacterial or viral infections, was investigated by exposing germfree mice to pure NO_2 in sterile chambers and then killing them after an appropriate exposure period. This method made possible the production and characterization of a chemically induced lesion not altered by the presence of respiratory disease-causing organisms. Examination of the NO_2-exposed tissue showed that alterations involved primarily the bronchiolar epithelium and alveolar tissue near terminal bronchioles and suggested that a stimulation in cell activity, rather than damage and destruction, results from NO_2 inhalation, at least at the exposure levels involved. Results also suggested that only cells in direct contact with NO_2 undergo structural and metabolic change. In an additional study, both germfree and conventional mice, after NO_2 exposure, were contaminated with either staphylococcus aureus bacteria or with influenza virus. Although there was greater deposition of organisms in the lung of NO_2-exposed animals than in the germfree control group, the lung clearance rates for S. aureus of both groups were nearly identical. Control and NO_2-exposed germfree mice both responded to virus contamination with significantly increased resistance, much the same as conventional mice, a phenomenon which is not understood at present.

4373 APTIC NUMBER 13853

Burton, George G., Morton Corn, J. Bernard L. Gee, Charles Vasallo, and Armand P. Thomas
RESPONSE OF HEALTHY MEN TO INHALED ION CONCENTRATIONS OF GAS-AEROSOL MIXTURES. Arch. Environ. Health, 18(4):681-692, April 1969. 22 refs.

The possibility of the presence in man of a gas-aerosol synergism was investigated in an attempt to explain earlier studies which failed to demonstrate lung changes in healthy adults exposed to single pollutants at typical urban air concentrations. Measurements of airway resistance and pulmonary flow resistance were made on ten subjects during precisely controlled and characterized pollutant exposures. The experiments were further designed to detect possible changes following pollutant exposure at concentrations which resembled those found in urban air. Results confirmed existing evidence that exposure of humans to low concentrations of SO_2 in air do not result in immediate physiologic effects on

measures of pulmonary mechanics and failed to demonstrate gas-aerosol synergism for SO2 and inert aerosols at concentrations which approximate those in urban atmospheres. It was suggested that only two out of every ten exposed subjects may show physiological reactions, implying that in future exposure studies large numbers of 'normal' subjects will need to be studied to locate persons who show effects of inhaled pollutants on pulmonary mechanics. The existence of gas-aerosol synergism was not ruled out, but added parameters and some methodological changes will be necessary for future studies.

4374 APTIC NUMBER 13858

Cassell, Eric J.
THE EFFECT OF AIR POLLUTION ON THE BURDEN OF ILLNESS IN A NEW YORK POPULATION. J. Environ. Sci., 13(4):27-29, August 1969. 8 refs.

Reports from the Cornell Family Illness Study have indicated effects of urban air pollution on a normal population. Several statistical analyses on illness in a New York population have been performed on the data from this study to examine the complex variables in the environment that appear to cause adverse health effects. It was found that the effect of air pollutants varies from season to season and is markedly affected by weather. The relationship varies, depending on whether new episodes of illness are considered, or the persistence of old symptoms. It was also found that various age groups differ in their responsiveness to both weather and air pollution. For some symptoms, such as eye irritation, the effect seems to be immediate, but for others, such as the common cold and cough, there appears to be a time lag in the production of symptoms. Also, what is reported as the same symptom may occur under very different environmental situations, illustrating the limited response potential of the human body. (Author conclusions modified)

4375 APTIC NUMBER 13059

Chovin, P. and L. Truffert
DISTRIBUTION AND SIGNIFICANCE OF CARBON MONOXIDE AS AN ATMOSPHERIC POLLUTANT. IMPORTANCE OF OTHER POLLUTANTS EMITTED IN AUTOMOBILE EXHAUST. (Distribution et signification de l'oxyde de carbone en tant que polluant atmospherique. Importance des autres polluants emis par les gaz d'echappement des vehicules automobiles). Text in French. Pollut. Atmos. (Paris), no. 39: 148-155, July-Sept. 1968. 66 refs.

The distribution of carbon monoxide is discussed, particularly that arising from automobile exhaust gases, and an empirical formula is given for calculating the carbon monoxide content at any height, given a background concentration, the number of vehicles per hour, and a constant which in turn is a function of the width of the road and the height of the exhaust. The hemoglobin-CO reaction in the blood is reviewed, and studies made on police officers in Paris are cited in which levels of blood carbon monoxide were determined. In non-smokers, there was a definite rise in concentration. Levels fixed in California for carbon monoxide in ambient air are cited as 30 ppm for 8 hours or 120 ppm for 1 hour for serious exposure; exposure of 240 ppm for 1 hour can cause acute illness, since 10% of the hemoglobin is bound as carboxyhemoglobin. Effects of carbon monoxide in man other than combination with hemoglobin are cited, i.e., effects on the blood-forming apparatus, circulatory system, and the eye. Other pollutants arising from automobile exhaust are mentioned, including lead, oxides of nitrogen, compounds produced by photochemical reactions with ozone, and aldehydes. In conclusion, the many differences in allowable levels of carbon monoxide in Russia and western countries are pointed out, and the differences in carbon monoxide ingestion between smokers and non-smokers. A common sense approach to setting standards for air quality is advocated.

4376 APTIC NUMBER 13215

Colombini, P., C. Mauri, R. Olivo, and G. Vivoli
EXPERIMENTS ON RABBITS FED FORAGE GROWN NEAR AN ALUMINUM FACTORY. Fluoride Quarterly, J. Intern. Soc. Fluoride Res., 2(1):49-54, Jan. 1969. 2 refs.

Skin lesions resembling bruises were exhibited by individuals living near an aluminum factory in Chizzola, Italy. To study the etiology and pathogenesis of this phenomenon, male albino rabbits were fed forage grown near the factory and forage artificially contaminated by substances collected from the factory's purification system. At regular intervals, serum alkaline phosphatase, serum calcium, serum phosphate, leucocyte alkaline phosphatase, and nonspecific esterases were determined. After about five months, the animals were killed and fragments of their tibia were analyzed for fluoride. The serum alkaline phosphatase, calcium, and phosphorous levels did not show any significant changes in the treated animals. A decrease in the leucocyte alkaline phosphatase activity of positive cells was observed. Nonspecific esterases were present in very small quantities in pseudo-eosinophils, in traces in lymphocytes, and in slightly greater amounts in monocytes. The fluoride content of the bones of treated rabbits was almost twice as high as that of control rabbits, who received forage from uncontaminated areas. (Author summary modified)

4377 APTIC NUMBER 13871

Coudray, P. and J. Mear
SURVEY OF THE CARBON MONOXIDE IMPREGNATION OF POLICEMEN ON TRAFFIC DUTY IN BORDEAUX. (Etude de l'impregnation oxycarbonee des gardiens de la paix assurant la circulation des vehicules automobiles a Bordeaux). Text in French. Pollut. Atmos. (Paris), 11(41):20-22, Jan./May 1969.

In repitition of a study first conducted in Paris, policemen on traffic duty in Bordeaux were divided into groups of smokers and nonsmokers and, twice a day, the proportion of carboxyhemoglobin their blood was deduced from the percentage of aveolar carbon monoxide. The saturation levels obtained for both groups were compared to those of officers whose desk duties did not expose them to traffic fumes. The mean percentage of

carboxyhemoglobin in the blood of officers who smoked was 2.35 in the morning, 4.71 in the evening. They exhibited a greater daily increase in carboxyhemoglobin than did policemen in Paris. The mean percentages obtained for traffic officers who did not smoke was 1.730 in the morning, 2.690 in the evening. Saturation was considered significant in 40% of the cases observed in both groups. In the control group, the percentage of carboxyhemoglobin remained relatively constant throughout the day. The mean level was 1.6 in the morning, 1.14 in the evening.

4378 APTIC NUMBER 12547

Craste, C.
FLUORIC POISONING. (CONTINUED.) (L'intoxication fluoree.)
Text in French. Rev Med Veterinaire, 103:214-221. 1952.

The toxicity of milk produced by animals struck with fluorosis or flucridosis is difficult ot ascertain. This was shown in the experiments on rats by the Wisconsin (U.S.A.) Agricultural Station (1938). Work by Thieberox cn young French children in the vicinity of aluminum factories fails to determine whether their absorption of fluorine is due to their drinking of milk from affected cows or their inhalation of polluted air. Radical prophylaxy of fluorisis and fluoridosis could be achieved by suppressing the toxic emanations from the aluminum factories. These emanations pollute the neighboring agricultural establishments. Cattle struck by "factory disease" were found as far as 25 km from five factories in the Maurienne and Gard areas. Public authorities and electrometallurgical companies are involved in the solution of the problem. Their reluctance to act may lead the public to resignation, were it not for the fact that one factory in the Alps has successfully prevented the disease in its area. But it keeps its method secret, and only the public authorities may, some day, force its disclosure. Fluoric poisoning can be cured only when caught early. The best treatment is to eliminate all toxic fodder from the animals' diet, since the origin of the "factory disease" is exclusively of a digestive nature. To do this, the flock is moved to some unpolluted area. This treatment will result in permanent cure. Medical treatment can be considered only as complementary.##

4379 APTIC NUMBER 12549

Craste, C.
FLUORIDE POISONING. ((L'intoxicatica fluoree.)) Text in French. Rev Med Veterinaire, 103:142-148, 1952. 9 refs.

Subacute and chronic forms of poisoning are, clinically and anatomopathologically, closer to each other than has been claimed. Bone lesions (marmoration, narrowing of marrow channels) cause brittleness and fractures. Dental lesions (mottled enamel of permanent teeth) are found in North America, Brazil, Argentina, North Africa. Tooth decay and gengivitis made chewing difficult, the animal wastes away and loses its value in the rural economy. Fluoridosis (sodium fluoride poisoning through water intake and calcium fluoride poisoning through vegetable intake) appears slowly in factory workers handling natural phosphates. Fluorosis, caused by hydrofluoric acid, appears suddenly in plants and animals downwind from the factory. In cryolite factories, lombar ankylosis and muscular calcification may appear, and even kidney and liver lesions, osaciatica, and cachexy. All farm animals may be subject to fluorosis. Goats and cattle are highly sensitive, horses quite resistant; poultry may also be affected. Speed of evolution depends on food toxicity, the richness and variety of the diet, and on the activity of the infection generating centers and factories. Pathology: Fluorine acts on the parenchyma, the general metabolism, and calcium metabolism. Depending on the dose of the compound, the action may be acute (toxic action with sudden decalcificatio() or subacute (on the parenchyma and general metabolism) or chronic (on phosphocalcium metabolism). Fluorosilicates are highly toxic. Sodium fluoride decalcifies and marmorizes the bones.##

4380 APTIC NUMBER 12550

Cristiani, H. and P. Gautier
FLUORINE FROM THE VIEWPOINT OF INDUSTRIAL HYGIENE: ACTION OF FLUORINE ON ANIMALS. ((Le fluor au point de vue de l'hygiene industrielle: action du fluor sur les animaux.)) Text in French. Ann. Hygiene Publ. (n.s.), 3:210-233, 1925. 50 ref

Acute poisoning by sodium fluoride may be produced by intestinal absorption of 0.5 gr per kg of animal or by veinous absorption of 0.1 to 0.15 gr per kg of animal. Chronic cases by absorption of smaller doses also set forth. The toxicity of fluorsilicic acid seems due to its low dissociation power and high content of HF molecules. The relation between emanations from aluminum factories and the endemic sickness prevailing in the surrounding area, as described in the literature, is confirmed by the authors' experiments on a particular installation: (1) plants were damaged soon after the factory began operating; characteristic foliage lesions appeared on vine and fruit trees, and reduction of the crops coincided with the factory activity. (2) Cattle showed stiffening of the legs, loss of weight, bone fracture, cachexy, and death. Tabulated data and maps support these observations. (3) On humans, no positive conclusions are yet available. They are less affected than animals, since the latter are poisoned by feeding on damaged plants, whereas the former clean and prepare these plants before consuming them; and poisoning or humans through toxic gases is minimized by the conditions (temperature, distributio() existing within the factory.##

4381 APTIC NUMBER 12957

Daly, Walter J.
PULMONARY DIFFUSING CAPACITY FOR CARBON MONOXIDE AND TOPOGRAPHY OF PERFUSION DURING CHANGES IN ALVEOLAR PRESSURE IN MAN. Am. Rev. Respirat. Disease, 99(4):548-553, 1969. 18 refs.

Breathholding carbon monoxide diffusing capacity and the topographic distribution of pulmonary perfusion (xenon 133 distribution) were measured in normal seated men before and during graded changes in airway pressure. When airway pressure increased, the preponderance of flow distribution shifted downward in the lung; diffusing capacity varied linearly with

airway pressure in the range of -20 to + 60 mm Hg. These results confirm, in man, previous observations using isolated lungs, and they show the normal dependence of pulmonary flow topography on alveolar pressure. The associated changes in diffusing capacity suggest that increases in alveolar pressure compress the pulmonary capillary net and make less blood available for CO absorption. (Author summary modified)

4382 APTIC NUMBER 13462

Davis, George G. and Walter P. Huey
CHRONIC MANGANESE POISONING: TWO CASES. J. Ind. Hyg., 3:231-238, 1921. 11 refs.

Aspects of manganese poisoning are discussed, and two case histories are reported. Manganese poisoning, though comparatively rare, causes a symptom which is complex, definite, and constant enough to be readily diagnosed. Manganese enters the body through coarse dust being swallowed with the saliva. The person must be highly susceptible to manganese, as manganese ores are usually non-toxic. The chronic manganese poisoning syndrome is described. The pathology of the disease is unclear. Prophylaxis is the only treatment of chronic manganese poisoning. The prognosis is not fatal, but symptoms do not change. Two case histories, both adult male manganese steel production workers, are reported.

4383 APTIC NUMBER 13016

Dille, J. Robert and Stanley P. Mohler
DRUG AND TOXIC HAZARDS IN GENERAL AVIATION. Aerospace Med., 40(2):191-195, Feb. 1969. 7 refs.

The potential and the documented roles of drugs, alcohol, pesticides, and carbon monoxide in general aviation accidents are discussed. Drugs are rarely reported as a cause of aircraft accidents due to the relatively infrequent search for their presence. Alcohol has been found present in up to 35.4% of fatal aviation accidents but a causal role has been ascribed in only about 7%. In two small samples, evidence of pesticide poisoning in fatal aerial applicator accidents was found in one-third of the cases. The chlorinated hydrocarbon insecticides vary widely in chemicals structure and activity. They act primarily on the central nervous system but the exact mechanism of action is not known. Insecticides produce some gastrointestinal effects and liver and kidney damage. They are stored in fat and released very slowly. The fat levels are felt to be mostly inactive materials but on occasion convulsions many months after exposure have been noted. Signs and symptoms usually consist of headache, nausea, dizziness, hyperexcitability, tremor, and convulsions followed by coma. Carbon monoxide is believed to cause about three fatal accidents per year; most are due to faulty exhaust manifolds and heater assemblies. Carbon monoxide from smoking tobacco products can significantly affect hypoxia tolerance and night vision, but is rarely, if ever, found as an accident cause.

4384 APTIC NUMBER 12960

Einbrodt, H. J. and U. Ant
GRAIN-SIZE DUST DISTRIBUTION IN THE LUNGS OF INHABITANTS IN POLLUTED AND UNPOLLUTED AREAS. (Die Korngrossenverteilung in Lungenstauben von Bewohnern aus Gebieten mit und ohne Luftverschmutzung). Text in German. Arch. Hyg., 153(2):98-104, 1969. 28 refs.

Dust in the lungs of ten diseased persons from non-industrial areas and 15 persons from industrial areas were analyzed. In six cases dusts found in the lymph nodes were also available. None of the persons had died of any lung disease or of any disease due to dust inhalation. All dusts were separated from the lungs and lymph nodes by the formamide method. Diameters of the dust particles were determined with electron and light microscopes. The frequency maxima of the particle diameters, as well as the medians of the particle size plots, were found to lie below 1 micron. An approximately logarithmic normal distribution was found. The dust particle size spectra of three samples (lung dust from industrial areas, lung dust from residential areas, and lymph node dust from industrial areas) differed little from each other and agreed with the corresponding spectrum of airborne dust in large industrial cities. Electron microscopy further showed that only fine dust particles accumulate in the lungs; large particles either do not penetrate into the interstitial tissue, or if they do, they are eliminated again. Direct particle size analysis showed that quartz particles of more than 3.5 microns predominated.

4385 APTIC NUMBER 12984

Einbrodt, H. J., H. Kinny, and H. Kortsane
QUANTITATIVE STUDIES ON LEAD TRANSPORT BY LYMPHATIC GLANDS IN THE HUMAN LUNG. (Quantitative Untersuchungen uber den Lymphtransport von Blei aus der menschlichen Lunge). Text in German. Arch. Hyg., 153(2):105-108, April 1969. 12 refs.

Dusts from the lymphatic glands of 17 female residents of the Ruhr area and 18 miners afflicted with silicosis were examined for their lead content. For this purpose the dusts were isolated by the formamide method. The dust from the female lymphatic glands contained an average of 53 micrograms of lead (absolute) and 5.5 mg Pb per 100 g dry tissue. As a measure of the lymphatic transport, the quotient: lead in the lymphatic gland dust/% lead in the lung dust was used. Thus, a quotient of 2 for the lymphatic transport was obtained in this case. The dusts in the lymph glands of the miners contained on the average 62 micrograms of lead (absolute) and 1,339 mg Pb per 100 g dry tissue. The quotient for the lymphatic transport of lead was 1.22. This quotient is almost as high as that of quartz, and the quotient for women is even higher. But strikingly enough, a still higher quotient was found in the control group. This can be explained by the fact that lymphatic transport ceases in persons afflicted with silicosis since the glands are filled, whereas in persons not exposed to dust, lymphatic transport is maintained. The studies also showed that lead has a cytotoxic effect which is similar to that of quartz.

4386 APTIC NUMBER 12646

BEHAVIORAL TOXICOLOGY LOOKS AT AIR POLLUTANTS. Environ. Sci. Technol., 2(10):731-733, Oct. 1968.

Behavioral toxicology research attempts to relate subtle chemical and physiological changes induced in the brain to changes in behavior. A research group under Dr. Charles Xintaras, head of the National Air Pollution Control Administration's behavioral toxicology unit, is studying the effect of various air pollutants on the neurochemistry, neurophysiology, and behavior of rats and monkeys. The Cincinnati group has concentrated its studies on three commonly occurring pollutants: Carbon monoxide which appears to interfere with the subject's awareness of his environment; ozone which may impair vision and depress body temperature; and lead which appears to interfere with brain function. The preliminary studies are discussed and a brief review of the work to be undertaken is presented.##

4387 APTIC NUMBER 13886

Epstein, Samuel S. and H. Shafner
CHEMICAL MUTAGENS IN THE HUMAN ENVIRONMENT. Nature, 219(5152): 385-387, July 27, 1968. 13 refs.

Preliminary data are presented on the feasibility of mutagenicity testing in mice based on screening a wide variety of environmental pollutants. In the dominant lethal test, treated males were mated with groups of females. The females were subsequently dissected at mid-term of pregnancy to evaluate the incidence of dominant lethal mutations. Such effects conveniently reflect mutagenic activity and represent fetuses killed in utero by mutations directly induced in male germ cells. The possibility of systemic drug effects in females was thus excluded. Test materials were freshly prepared and injected intraperitoneally. A mutagenic index (M.I.), reflecting the incidence of dominant lethal mutations in an experimental group of animals, was calculated. The index does not reflect anti-fertility effects or the distribution of deciduomata in affected animals. It was found that organic extracts of atmospheric particulate pollutants displayed control M.I. levels. The dominant lethal test described appeared to be a practical screening procedure, especially because 80% of gene mutations in man are attributable to dominant autosomal traits. Modification of the test procedures to evaluate the role of chronic low-level exposure to environmental mutagens, either singly or in combination, is in progress.

4388 APTIC NUMBER 12970

Evenshteyn, Z. M.
EFFECT OF TECHNICAL-GRADE ALUMINUM DUST ON THE TRACHEOBRONCHIAL SYSTEM IN MAN. (Vliyaniye pyli tekhnecheski chistogo alyuminiya na trakheo-bronkhial 'nuyu sistemu u chelcveka). Text in Russian. Vrachebnoe Delo (Kiev), no. 3:132-133, March 1969.

Clinical-laboratory studies were made of 11 male metal finishers who had worked not less than 2 years with 99.5% pure technical aluminum. It was established that 45-50 mg Al was inspired per shift. From sputum collections it was estimated that on an average, 71% of the inspired Al was expectorated during the 7-hr work day; 68% of the remainder was expectorated upon waking or during the morning toilet and in many cases it was darker in color. It is estimated that 84.5% + or - 6.06% of the inspired Al is expectorated over a 24-hr period.

4389 APTIC NUMBER 13860

Feldstein, M.
TOXICITY AND ANALYSIS OF AIR POLLUTANTS. J. Forensic Sci., 14(3):337-351, July 1969. 44 refs.

The emission of solids, liquids, and gases from industrial operations, power and heat generation using fossil fuels, combustion of organic waste materials, and auto exhaust constitute the major sources of air pollution. Carbon monoxide, as a community air pollutant, is emitted to the atmosphere from most combustion operations where incomplete combustion of organic matter occurs. Exposures to 30 ppm for four to six hours may result in blood carboxyhemoglobin concentrations as high as 5% of the total pigment. Nitrogen dioxide is the primary reactant in photochemical smog, and is found to cause acute pulmonary edema. Physiological response to low concentrations of both SO2 and SO3 is similar and involves bronchial constriction. The response with SO3 is 4 to 20 times greater in experimental animals than with SO2 on an equal concentration basis. It is now believed that there is no tolerable dose of a carcinogen. Skin tumors were produced in animals by as little as 0.4 micrograms of benzpyrene. Part of the reason for increased lung cancer is ascribed to carcinogens present in air pollution. Several other pollutants and the various ways of analyzing pollutants are also discussed.

4390 APTIC NUMBER 13657

Filov, V. A.
KINETIC MODEL OF THE ACCUMULATION OF GASEOUS SUBSTANCES IN THE ORGANISM DURING PERIODIC INHALATION. (O kineticheskoy modeli nakopleniya v organizme gazoobraznykh veshestv pri ikh periodicheskom vdykhanii). Text in Russian. Doklady Akad. Nauk SSSR, 184(6):1458-1460, 1969. 9 refs.

A mathematical model was constructed to determine the concentration of an inhaled gas in tissues of an individual exposed to the gas during his working days. An equation was developed which defined the concentration in tissues at the nth working day in terms of the concentration of the substance in the inhaled air, the time of exposure, the days of exposure, and constants related to the distribution of a particular gas between tissue and air. When the equation was tested against chloroform and ethyl alcohol, for which most of the constants were known, the result corresponded with experimental data. The

equation was also successful in predicting tissue concentration of benzene and carbon disulfide in the fatty tissue of rabbits exposed for various periods to these gases.

4391 APTIC NUMBER 13985

Freigang, P., P. Seidel, and M. Flach
THE EFFECTS OF CARBON MONOXIDE ON THE MICROPHONICS AND ACTION POTENTIALS OF THE GUINEA PIG COCHLEA. (Zur Frage der Kohlenmonoxydauswirkung auf die Mikrophon- und Summenaktionspotentiale der Meerschweinchencochlea). Text in German. Arch. Klin. Exp. Ohren, Nasen, Kehlkopfheilkunde, 190(1):28-35, 1968. 40 refs.

Exposure of 14 guinea-pigs to various concentrations of carbon monoxide was followed by measurements of microphonics and action potentials (MP, SAP) which were carried out up to 60 min after poisoning. With 45 min exposure to 1% carbon monoxide, an irreversible SAP decrease down to one fourth of initial value was observed concomitant with a reversible MP depression of about 3 to 8 db. Additional control tests on 6 animals failed to show the same behavior. Shorter times of exposure (10 min) revealed no change of the cochlear potentials despite the increased carbon monoxide concentration of 1.2%. (Author summary modified)

4392 APTIC NUMBER 12951

Gadaskina, I. D. and N. B. Andreeva
SOME BIOCHEMICAL SHIFTS OCCURRING IN THE ORGANISM FOLLOWING CARBON DISULFIDE POISONING. (FREE SH-GROUPS AND BLOOD CERULOPLASMIN; COPPER AND ZINC METABOLISM). (Nekotorye biokhimicheskiye sdvigi v organizme pri otravlenii serouglerodom. (svobodnye SH-gruppy i tseruloplazmin krovi; obmen medi i tsinka). Text in Russian. Gigiena Truda i Prof. Zabolevaniya, no. 4:28-32, 1969. 14 refs.

Biochemical effects of carbon disulfide poisoning were studied on white rats. The content of free SH groups in blood serum changed with concentration of inspired carbon disulfide and exposure time, first decreasing, then increasing. No change in blood copper or ceruloplasmin content was detected when inspired carbon disulfide concentration was maintained at 3 mg/liter for 6 weeks. Rats killed after such exposure exhibited definitely increased copper levels in the liver, muscles, and testes, but no change in the bone marrow. Exposure to 0.01 mg/liter carbon disulfide for 13 weeks resulted in reduced ceruloplasmin in blood serum. Inspiration of 0.05 mg/liter carbon disulfide led to a definite increase in copper and zinc content of the feces after 9 weeks; excretion of copper was likewise detected after 9 weeks at 0.01 mg/liter exposure.

4393 APTIC NUMBER 13130

Galkina, K. A., T. A. Kochetkova, V. I. Kireev, and M. S. Tolgskaya
AN EXPERIMENTAL INVESTIGATION INTO PATHOGENICITY OF FLOUR AND GRAIN DUST. (Eksperimental'noe issledovanie patogennosti muchnoy i zernovoy pyli). Text in Russian. Gigiena Truda i Prof. Zabolevaniya, vol. 6:27-30, 1969. 4 refs.

Studies were made on the pathogenic action of flour and grain dust in 107 albino rats. Morphological and histochemical analyses disclosed changes in the upper respiratory tract and lungs. The flour dust produces chiefly bronchitis, bronchiolitis, catarrhal pneumon' and mildly pronounced interstitial pneumosclerosis. Because of its somewhat higher content of free SiO2 and the presence of fungal and bacterial flora, the grain dust exerts a greater irritative and fibrogenic action. However, a slight ascunt of free SiO2 contained in the flour and grain dust should not be considered a decisive factor in fixing their maximum permissible concentrations. (Author summary modified)

4394 APTIC NUMBER 13004

Gevorkyan, S. A., A. K. Dashtoyan, and N.G. Bagyan
WORK CONDITIONS AND PULMONARY AFFECTIONS IN PERSONS ENGAGED IN EXTRACTION AND PROCESSING OF LITHOIDAL PUMICE. (Usloviya truda i zabolevaniya legkikh u rabochikh, zanyatykh dobychey i dorabotkoy litoidnoy penzy). Text in Russian. Gigiena Truda i Prof. Zabolevaniya, 13(5):8-11, 1969. 6 refs.

A study of working conditions at quarries and crusher plants mining lithoidal pumice showed that the atmosphere around work places was greatly contaminated with dust, the degree of which was higher in the summer months. The dust was chiefly of a finely-dispersed nature, with 82.5 to 92.5% under 5 microns in diameter. Total SiO2 content amounted to 69.5% and that of free silica (cristobalite) amounted to 23 to 27.4%. Twenty workers suffering from bronchitis with a long service record in dust-producing occupations demonstrated initial manifestations of pneumoconiotic changes (15 persons) and pneumoconiosis in its first stages (5 persons). Among those patients with pneumoconiosis, four persons had the interstitial form and one demonstrated the mixed form of the disease. The detected changes were considered to indicate silico-silicatosis. (Author summary modified)

4395 APTIC NUMBER 12969

Golubev, A. A.
EFFECT OF CERTAIN INDUSTRIAL IRRITANTS ON CHANGE OF PUPIL DIAMETER IN THE RABBIT. (Ob izmenenii diametra zrachka krolika pod vliyaniem nekotorykh promyshlennykh yadov razdrazhayushchego deystviya). Text in Russian. Gigiena Truda i Prof. Zabolevaniya, no. 4:58-59, 1969.

The effects on pupil size in the rabbit were determined over a 30-min period for the following industrial irritants (molar threshold concentration given in parentheses): ethanol (2), dioxane (2), methylethylketone (1/4), epichlorohydrin (1/4), acetic anhydride (1/8), crotonaldehyde (1/16), ethylene glycol (1), and xylene (1/132). Indications by the method described correlate well with the usual means of determining irritative

effects (dioxane is an exception for which this method indicates a higher irritative effect). It is noted that this method is effective at concentrations which cause no visible changes in either the conjunctiva or cornea of the rabbit.

4396 APTIC NUMBER 13114

Gotz, Hans and Norbert Fluken
THE EFFECTS OF AIR POLLUTION ON THE SKIN. STUDIES IN INDUSTRIAL AREAS. (Uber den Einfluss von Luftverunreinigungen auf die Haut. Untersuchungen mit Immissionsstoffen im Industriegebiet). Text in German. Muench. Med. Wochschr. (Munich), 111(18):1021-1027, May 2, 1969. 41 refs.

To test the effects of air pollution on the skin, dust jars and vaseline-greased foil were set up in various industrial cities of West Germany to obtain representative dust samples. From all the samples, four were selected which were thought to be most characteristic of the chemical composition of aerosols of various areas. The sultates in the four samples ranged from 5.9 to 25.08%, the chlorides from 0.78 to 4.33%, and ammonia from 1.06 to 1.56%. The air pollution concentrations measured in the four areas differed considerably from each other. The hydrogen ion concentration varied tremendously, not only among the four zones, but also at the same sampling station. To determine whether air pollutants irritate the skin, the epicutaneous skin testing method was used. Two groups of test persons were formed: one to see the reaction (if any) after 24 hours, the second to determine the effects after 48 hours of skin exposure to the air pollutants. Over a period of 2 years, a total of 11,922 individual tests were performed. None of the test subjects had eczema prior to the experiments. Skin irritation in the form of inflammatory erythema and follicular swellings in healthy persons did occur as a result of the effect of the air pollutants. The probability of skin irritation of some kind was higher at higher sulfate, chloride, and ammonia concentrations. With psoriasis patients, psoriasis efflorescence seen as Kobner's irritation phenomenon developed in skin areas which case into contact with the air pollutants. Among the numerous tests, however, no single case of allergy occurred.

4397 APTIC NUMBER 12670

G. M. Green
CIGARETTE SMOKE: PROTECTION OF ALVEOLAR MACROPHAGES BY GLUTATHIONE AND CYSTEINE. Science, 162(3855), 810-811, Nov. 15, 1968. 3 Ref.

Phagocytosis of bacteria by rabbit alveolar macrophages is inhibited quantiatively by cigarette smoke in vitro. This phagocytoxic effect was abolished by addition of 0.2 to 0.4 micromole of glutathione or cysteine per ml of cigarette smoke. Serum protein was required to obtain both the toxic effect of the smoke and the protective action of the sulfhydryl compounds. The protective role of the sulfhydryl agents suggests an oxidant action of the cigarette smoke on these pulmonary cells. (Author's Atstract)##

4398 APTIC NUMBER 12178

Leonard Greenburg, Carl L. Erhardt, Franklyn Field, and Joseph I. Reed
AIR POLLUTION INCIDENTS AND MORBIDITY STUDIES IN NEW YORK CITY. Preprint, Albert Einstein Coll. of Medicine, Bronx, N. Y. and New York Dept. of Health, New York, ((15))p., ((1962)). 4 refs.

Starting in 1962, a prospective epidemiologic study designed to investigate the effects of air pollution and meteorology on morbidity and mortality was initiated in New York City. These prospective studies are now being continued along two lines. The first is by the careful documentation of air pollution episodes in order to determine whether such incidents affect New York City and influence the health of its residents. The second avenue of epidemiolcgical exploration is the detailed study of variations in morbidity for certain causes. One disease which it was believed might be influenced by air pollution is asthma. The study of asthma visits to the emergency clinics in several large New York City hospitals revealed a rather interesting and challenging pattern.##

4399 APTIC NUMBER 12532

Gudjonsson, S. V.
((CRYOLITE POISONING.)) Kryolitherkrankung. Text in German. Arztliche Sachverstandigen Zeitung, 41(12):155-157, Jun. 1935.

A new disease was discovered in Copenhagen, Denmark, through X-ray examinations of the workers in the cryolite plant. Cryolite is a fluorine containing mineral which is presently only mined in Greenland. Only two factories in the entire world (in Canada and Denmark) process this mineral. It is used in the production of enamel and opal glass. In aluminum fabrication it serves as catalytic agent. In an examination of 80 workers occupied with the grinding of the material it turned out that they all felt pains in their limbs and complained about lack of appetite, nausea and fatigue. They all walked with a stiff back. The X-rays showed serious deformations of the skelton. The lungs had the appearance of those of silicosis patients. But silicic acid, the cause for siliconis, is hardly a major component of cryolite. The cause for the disease was found in the fluorine contents of the cryolite. This assumption can be verified by laboratory experiments conducted with rats, dogs, calves, pigs, and sheep. Another interesting observation has been made. During a volcanic eruption - about 150 years ago - numerous animals and humans died. Examinations of the bones of animals which died at that time showed that they suffered from serious fluorosis. Thus not only cryolite plants but also volcanic areas can be hazardous in this respect, not to speak of aluminum and other plants.##

4400 APTIC NUMBER 12284

Gusev, M. I. and A. A. Minayev

AN HYGIENIC STANDARDIZATION OF ALPHAMETHYLSTYRENE IN ATMOSPHERIC AIR. In: The Biological Effects and Hygienic Importance of Atmospheric Pollutants, Book 10. Translated from Russian by B. S. Levine, U.S.S.R. Literature on Air Pollution and Related Occupational Diseases, Vol. 17, pp. 139-145, 1968.
CFSTI: PB 180522T

The toxic effects of alphamethylstyrene (AMS) were investigated, and the maximum average-daily allowable concentration of this vapor was determined in experiments using white rats. On the basis of the data obtained, it is concluded that: (1) alphamethylstyrene vapors in concentration of 5 mg/cu m and lower had no effect on the behavior, weight, and general blood picture (leucocyte, erythrocyte, hemoglobin count) of the test animals. (2) An AMS concentration of 5 mg/cu m depressed the central nervous system (increased reflex time), altered the bio-chemical reactions (reduced the content of nucleic acids in the blood and of coproporphyrin in the urine), and changed the luminescent properties of the leucocytes. Functional changes were confirmed by pathohistological changes in lungs, liver, heart, and kidneys. (3) In concentration 0.5 mg/cu m AMS altered mg/cu m had no effect. (4) The maximum average tolerance allowable concentration of AMS vapors in atmospheric air can be set at the level of its accepted single-exposure allowable concentration of 0.04 mg/cu m which is the inactive level in chronic inhalation exposure of the experimental animals.

4401 APTIC NUMBER 12278

Gusev, M. I., I. S. Dronov, A. I. Svechnikova, A. I. Golovina, and M. D. Grebenskova
CHRONIC EFFECTS ON THE ORGANISM OF SMALL CONCENTRATIONS OF ACRYLALDEHYDE IN AIR. In: The Biological Effects and Hygienic Importance of Atmospheric Pollutants, Book 10. Translated from Russian by B. S. Levine, U.S.S.R. Literature on Air Pollution and Related Occupational Diseases, Vol. 17, pp. 77-84, 1968.
FSTI: PB 180522T

Effect of low acrylaldehyde (AAD) concentrations in the air on the living organism was studied by exposing 40 white rats to daily 24-hour continuous inhalation of AAD over a period of 60 days. The rats were divided into 4 equal numbered groups; three of the groups were housed in special inhalation chambers; animals of group 4 served as controls. The AAD concentrations in the chambers housing Groups I, II, and III were correspondingly as follows in mg/cu m: 1.52 plus or minus 05 with fluctuations from 1 to 2 mg/cu m; 0.51 plus or minus 0.2 with fluctuations from 0.22 to 0.77; and 0.15 plus or minus 0.01 with fluctuations from 0.1 to 0.3. The following indexes were used in the study: changes in weight and behavior, in conditioned-reflex activity; changes in whole-blood cholinesterase activity, in rate of coproporphyrin elimination via the urine, in the percentage of luminescent leucocytes, and pathological changes in the organs and tissues of post mortem rats which died during the inhalation tests, or were sacrificed at the end of the experiment. The following conclusions were drawn: (1) Prolonged inhalation of acrylaldehyde (AAD) vapor in 0.51 and 1.52 mg/cu m concentrations caused weight loss, changes in conditioned reflex activity, a reduction in cholinesterase activity, a drop in porphyrin metabolism, and an increase in the percentage of luminescent leucocytes in the blood of the experimental animals. (2) Aside from an increase in leucocytes, no changes were effected by the inhalation of 0.15 mg/cu m of AAD under identical circumstances. The secondary luminescent method presents the opportunity to directly observe the earliest physiochemical and morphological changes in the cells. Therefore, it can be recommended for determining the average daily maximum allowable concentration of a pollutant in atmospheric air and (3) the presently established maximal average daily allowable concentration of AAD in atmospheric air (0.1 mg/cu m) is below the threshold of activity and may be retained without change.

4402 APTIC NUMBER 13110

Hilfenhaus, J., W. Schmitt, and H. J. Einbrodt
STUDIES ON THE ADSORPTION OF LIPIDS FROM ERYTHROCYTE MEMBRANES BY SILICONE AND NON-SILICONE DUSTS. (Untersuchungen uber die Adsorption von Lipoiden aus Erythrozytenmembranen durch silikogene und nichtsilikogene Staube). Text in German. Arch. Hyg. 153(1):9-13, Feb. 1969. 22 refs.

To test whether hemolysis can be due to adsorption of membrane-bound lipids on quartz particles, the hemoglobin of cattle erythrocytes was osmotically separated and the membranes were incubated with quartz. For comparison, some membranes were incubated with non-silicone dusts such as Al2O3 and TiO2. The dusts were subsequently separated and analyzed for adsorbed lipids. The results showed that the dusts differed very little in the amount of lipids they adsorbed, despite their different zytotoxic effects. Stadler's hypothesis that lipids adhere more readily to silicone dusts than to non-silicone dusts is thus disproved. It is much more likely that there is a slight, nonspecific adsorption of membrane by both kinds of dusts, as indicated by electron microscopy and the fact that proteins were found simultaneously. Furthermore, the dusts were never quite free of membranes. The relatively low protein concentrations compared to the lipid concentration are probably due to the intense drying of the dusts prior to analysis. The dried, sedimented dusts contained lysolecithin, lecithin, two cephalins and sphingomyelins as shown by thin layer chromatography. Chromatography also showed that none of these four lipid components was adsorbed by the quartz dust. A specific adsorption of other lipids, of which the membrane contains only traces, cannot be ruled out by these studies, but it seems to be very unlikely.

4403 APTIC NUMBER 13111

Hilfenhaus, J., P. Hagemeyer, A. Kloesel, and H. J. Einbrodt
THE EFFECT OF QUARTZ ON THE CELL MEMBRANES OF BACTERIA USING THE EXAMPLE OF MICROCOCCUS LYSODEIKTICUS. (Die Wirkung von Quartz auf Bakterienzellmembranen am Beispiel des Micrococcus lysodeicticus). Text in German. Arch. Hyg. 153(1):14-20, Feb. 1969. 22 refs.

Micrococcus lysodeikticus was cultivated on agar for 16 hours at 37 C. The cultures were transferred to 50 ml Fraser's medium and incubated for 6 hours at 37 C. Subsequently, 2 ml were measured out into 50 ml fresh Fraser's medium and incubated again for 14 hours. After membrane filtration, the retained test material was

washed three times with 20 ml of 0.15 M NaCl and suspended in 0.15 M NaCl or in 1.5 M NaCl. This bacteria suspension was used for the enzymatic bacteriolysis by lysozyme. A protoplast suspension was also subjected to lysis. The degree of lysis was measured by the nucleic acid concentration. The influence of quartz was determined by mixing quartz dust into the bacteria suspension. The resulting bacteriolysis was determined by precipitating the dissolved proteins with perchloric acid and measuring the extinction of the clear fluid in the UV range. The extinction at the absorption maximum of 260 nm was a measure for the effective lysis. Generally it was found that quartz does not affect cell membranes. No inactivation of quartz by proteins could be observed. Membrane damage must therefore be caused by specific structure or substances characteristic of those membranes.

4404 APTIC NUMBER 13148

Holland, W. W., T. Halil, A. E. Bennett, and A. Elliott
FACTORS INFLUENCING THE ONSET OF CHRONIC RESPIRATORY DISEASE.
Brit. Med. J., 2(5651):205-208, April 26, 1969. 15 refs.

To investigate the effect of different environmental and personal factors on ventilatory function, 10,971 children in four areas of Kent were examined. Details of past respiratory illnesses were obtained by a questionnaire completed by the parents; the examination included measurement of height, weight, and peak expiratory flow. Area of residence, social class, family size, and a past history of pneumonia, bronchitis, or asthma were found to be associated with differing levels of peak expiratory flow. These four factors acted independently, and the effects were additive. It is suggested that environment in the early years of life can produce adverse changes which may exist throughout life and contribute to the development of chronic respiratory disease. (Author abstract modified)

4405 APTIC NUMBER 12580

Holma, B.
THE INITIAL LUNG CLEARANCE OF DI-DISPERSE (2 MICRON AND 7 MICRON) POLYSTYRENE PARTICLES IN RABBITS. Arch. Environ. Health. 17(6):871-873, Dec. 1968. 3 Refs.

The difference in the simultaneous initial course of lung clearance of 2 micron and 7 micron monodisperse polystyrene particles has been studied in rabbits. This lung function was registered with a fixed detector system during the first two hours after the animals had been exposed to the test aerosol via a tracheal tube. The results point out the importance of frequent and early data of the lung retention of studied particles for the evaluation of the function of lung clearance. (Author's Abstract)##

4406 APTIC NUMBER 13649

Kahana, L. M. and M. Aronovitch
PULMONARY SURFACE TENSION AFTER SULFUR DIOXIDE EXPOSURE. Am. Rev. Respirat. Disease, 98(2):311-315, Aug. 1968. 25 refs.

The effects of sulfur dioxide on the surface tension of lung extracts were examined by direct measurement in the modified Wilhelmy balance. Three groups of rats were exposed to 0, 804.8 ppm, and 1255.6 ppm SO2, and surface tension was measured in dynes/cm. The control group had mean values of 44.8 dynes/cm maximal and 18.4 dynes/cm minimal surface tension. Rats exposed to 804.8 ppm SO2 produced no respiratory distress signs, and the lungs showed no pathological changes. There was small but significant reduction in minimal and maximal surface tension. Changes suggesting pulmonary edema occurred in the 1255.6-SO2 group, including a significant increase in mean weight of the lungs. Mean maximal tension was reduced to 37.2 dynes/cm, and minimal tension to 11.7 dynes/cm. It appears that an increase in surfactant activity occurred and that the increase was caused by increased production of surface-active substance or by some qualitative change in it. Combined with findings of another study, these changes suggest a possible relationship to the pathogenesis of emphysema.

4407 APTIC NUMBER 13100

Kendrey, G. and F. J. C. Roe
CADMIUM TOXICOLOGY. Lancet, 1(7607):1206-1207, June 14, 1969. 41 refs.

There is evidence that the hazard of cadmium exposure, usually an occupational risk, may extend to the general population through the atmosphere, rain, or foods. The kidneys and other tissues of infants do not contain Cd in detectable quantity, whereas it is invariably detectable in the corresponding adult tissues. Laboratory exposure to Cd has been shown to cause a variety of metabolic disturbances, to shorten the lifespan of rats, and to give rise to a variety of functional changes. Cadmium may exert its toxic effects by inhibiting the enzymatic functions dependent upon the presence of Cu, Co, and Zn.

4408 APTIC NUMBER 13673

Khibin, L. S.
A CASE OF SEVERE CARDIOVASCULAR DISEASE IN A PATIENT SUFFERING FROM CHRONIC MANGANESE INTOXICATION. (Sluchay tyazhelogo porazheniya serdechno-sosudistoy sistemy u litsa, stradavshego khronicheskoy intoksikatsiyey margantsem). Text in Russian. Gigiena Truda i Prof. Zabolevaniya, 11(3):51-53, 1967. 12 refs.

A detailed clinical analysis is given of a 39-year old man who eventually died of severe cardiovascular disease apparently brought on by manganese intoxication. The man was admitted to the hospital suffering from epigastric pain, cough, headache, muscular pain, episodes of fever, and headache. He had no history of disease prior to the last five years, during which period he had worked as a miller in a factory grinding manganese ore. Although on autopsy he was found to have numerous lung lesions, the only indications of the direct cause of his disease were increased levels of manganese in the blood and liver.

4409 APTIC NUMBER 13013

Kohgo, Tetsutaro
THERMOSTATICALLY REGULATED HEATERS IN HOKKAIDO, JAPAN NEEDED FOR HEALTH REASONS. (Chiiki danbo ni tsuite: tckuni kankyo eisei no tachiba yori). Text in Japanese. Kuki Seijo (Clean Air-J. Japan Air Cleaning Assoc., Tokyo), 6(6):35-47, 1969.

Currently used heating facilities were studied from the health point of view from 1961 to 1966 in the province of Hokkaido, Japan. The PbO2 method was used to measure SO2 concentration, and the differences in air pollution caused by the stove-heating method and the currently existing radiated steam-heating method, which provides heat at only fixed intervals, were also studied. A questionnaire was utilized to discover the existing problems related to heating facilities of the people concerned. The concentration of SO2 in winter was found to be two to three times as high as in summer. In Sapporo, for example, visibility was 1.0 km for 29 days in December, 31 days in January, and 27 days in February. The concentration of SO2 was 1.0 mg/day/100 sq cm within a 4- to 5-km radius of the center of the city, and also 0.6 mg/day/100 sq cm within 13 km to the north and west and 5 km to the south and east. The amount of air pollution in a room with a regulated steam heater did not differ significantly from that of a room with a stove because the outside air pollution was extremely heavy. Room temperature became too hot at one time and too cold at another when the steam heater was used. Of the people who used the steam heater, 76.4% complained that the relative humidity was too low (35% on the average). Most people found that the amount of intermittent steam heat was inadequate; room temperatures averaged 16 to 17 C. The most frequent complaint was emotional irritability, followed by lack of appetite, odor, dryness, throat pains and mucus, raspy voice, and various gastro-intestinal discomforts. Existing heating facilities in Hokkaido were judged to be inadequate. Thermostatically regulated modern heating facilities are vitally needed to improve the health of persons living in this area.

4410 APTIC NUMBER 13158

Kondrashov, V. A.
ON THE TOXIC ACTION OF CHLORANILINE AND ANILINE FUMES ON THE ORGANISM THROUGH THE INTACT SKIN EXPOSED TO THEM. (O toksicheskom vliyanii parov khloranilinov i anilina na organizm pri vozdeystvii na nepovrezhdennuyu kozhu). Text in Russian. Gigiena Truda i Prof. Zabolevaniya, 13(5):29-32, 1969. 4 refs.

Toxicity of p-, m-, and o-chloroaniline, 3,4-dichloroaniline, and aniline was studied in mice, rats, cats, and rabbits. These substances were administered by application to the skin, perorally, and by inhalation. Chloroanilines were found to have toxicities comparable to that of aniline. It was established that under certain conditions the danger of poisoning by vapors of these substances through skin contact may be considerably greater than through inhalation poisoning.

4411 APTIC NUMBER 12280

Korneyev, Yu. P.
DETERMINATION OF ALLOWABLE MAXIMUM CONCENTRATIONS OF PHENOL AND ACETOPHENONE WHEN SIMULTANEOUSLY PRESENT IN ATMOSPHERIC AIR. In: The Biolcgical Effects and Hygienic Importance of Atmospheric Pollutants, Book 10, Translated from Russian by B. S. Levine, U.S.S.R. Literature on Air Pollution and Related Occupational Diseases, Vol. 17, pp. 97-107, 1968.
CFSTI: PB 1805221

The combined effect of phenol (Ph) and acetophenone (APh) vapors on the human organism was studied. The effect of low phenol and acetophenone concentrations simultaneously present in the air was investigated by the methods of threshold of odor perception, eye sensitivity to light, and electrical activity of the cerebral cortex. The summation concentration of the phenol and acetophenone mixture was expressed as a fraction of the odor threshold concentrations. The effect of low phenol and acetophenone concentrations on eye sensitivity to light was investigated using an adaptometer. The effect of low phenol and acetophenone concentration mixtures on the cerebrocortical activity was studied using a method involving amplification of the natural alpha-rhythm. The resorptive action of acetophenone was studied using rats in inhalation chambers. During the inhalation period the general condition, weight, blood cholinesterase activity, motor antagonist chronaxy, porphyrin metabolism, eosinophile count in peripheral blood, and rate of 17-ketosteroids and vitamin C elimination with the urine were checked. In conclusion, it may be stated that the threshold odor perception concentration of the gas mixtures tested by most sensitive test persons was 0.013 mg/cu m for phenol plus 0.004 mg/cu m for acetophenone with a fractional summation index of 1.0. An index of 0.72 was not perceptible. The effect of phenol and acetophenone simultaneously present in the atmospheric air equals the simple sum of their individual effects. Since the maximum allowable concentrations of phenol and acetophenone were established with some leeway, their maximum allowable combined single-exposure and average-daily concentrations, expressed as a fractional summation of the individual limit concentrations, such sum should not exceed 1.5. This also applies to a phenol-acetophenone-acetone mixture. Inoculation of experimental animals with phenol-acetophenone and with phenol-acetophenone-acetone elicited significant changes in cholinesterase activity, motor antagonist chronaxy, porphyrin metabolism, 17-ketcsteroid content, and caused pronounced ecsinopenia. The combination of phenol and acetophenone, and their combination with actone elicited no changes in the organism even upon prolonged (chronic) exposure to the inhalation of air containing simultaneously vapors of phenol and acetophenone or the two plus acetone when the fractional summation of their individual maximal allowable concentrations have indexes not exceeding 1.19 and 1.36 correspondingly.

4412 APTIC NUMBER 12270

Kulakov, A. Ye.
NEW EXPERIMENTAL MATERIAL FOR THE DETERMINATION OF MAXIMUM ALLOWABLE CONCENTRATION OF HEXAMETHYLENEDIAMINE IN THE AIR OF INHABITED AREAS. In: The Biological Effects and Hygienic

Importance of Atmospheric Pollutants, Book 10. Translated from Russian by B. S. Levine, U.S.S.R. Literature on Air Pollution and Related Occupational Diseases, Vol. 17, pp. 8-18, 1968.
CFSTI: PB 1805221

Continuous inhalation of Hexamethylenediamine (HMD) in 1 mg/cu m concentration for a period of three months unfavorably affect the organism of experimental animals inducing loss of body weight, raising the reticulocyte count, producing eosinopena, increased leucocyte count, lowering the phagocytic index and the rate of Vi-antibody productions, upsetting the normal motor chronary ratio in the antagonistic muscles, and inducing pathomorphological changes in the internal organs. Similar but milder changes are caused by an HMD concentration of 0.04 mg/cu m with the exception of loss of body weight and the number of reticulocytes. In 0.001 mg/cu m concentration HMD administered under identical conditions has no effect on the organism of the test animals. The average daily maximum permissible concentration of HMD in atmospheric air in inhabited areas can be the same as was previously proposed for the maximum single-exposure concentration, i.e., 0.001 mg/cu m. (Author's conclusion, modified)**

4413 APTIC NUMBER 13891

Lulling, J., J. Prignot, P. Lievens, F. Meersseman, and P. L. Masson
EXPERIMENTAL BRONCHOPNEUMOPATHY DUE TO SO2 IN THE DOG. Arch. Exp. Pathol. Pharmakol., 261(1):1-25, 1968. 19 refs.

Dogs were exposed to SO2 to induce experimental bronchopneumopathy for the study of the effects of bronchodilators and mucolytics. After the first exposure to SO2 (500 ppm for 2 hrs), the dogs showed a rise in both lung resistance (LR) and dynamic elastance (LE) which reached its maximum 48 hrs after exposure and was followed by a return to normal after 7 days. Repeated exposure to SO2 led to the appearance of the chronic obstructive syndrome. The chief clinical signs were cough, dyspnoea, production of bronchial secretions, rhonchi, sibilants, and, more rarely, moist rales. The LR was on the average 3 to 10 times higher than in normal dogs and the LE was 1.5 to 3.5 times higher. Intravenous injection of bronchodilators provoked lowering of the LR and of the LE of exposed dogs, and administration of mucolytics reduced the amount of bronchial secretions of the exposed animals.

4414 APTIC NUMBER 12994

Luomanmaki, Kimmo and Ronald F. Coburn
EFFECTS OF METABOLISM AND DISTRIBUTION OF CARBON MONOXIDE ON BLOOD AND BODY STORES. Am. J. Physiol., 217(2):354-363, Aug. 1969. 37 refs.

C-14-Labeled carbon monoxide was administered to 31 anesthetized dogs and 5 normal subjects who were breathing in a closed system. C-14-labeled carbon monoxide was oxidized to C-14-labeled carbon dioxide at average rates of 0.30 = or - (SD) 0.18 and 0.16 = or - 0.03%/hr of the total administered in dog and man, respectively. C-14-labeled carbon monoxide oxidation rates did not change significantly as a result of increasing the C-14-labeled carbon monoxide body stores 2-30 times normal or altering arterial oxygen tension from 30 to over 600 mm Hg. Rates of metabolic consumption of body C-14-labeled carbon monoxide appear to be insignificant compared to rates of C-14-labeled carbon monoxide production at normal levels of blood carboxyhemoglobin in man; in dog the rate of C-14-labeled carbon monoxide consumption was approximately 10% of the rate of production. Evidence is presented that the distribution of CO between blood and other tissues remains constant with changes in arterial oxygen tension from 40 to 650 mm Hg, arterial CO2 tension from 28 to 65 mm Hg, and carboxyhemoglobin from 0.0 to approximately 55% saturation. With more severe arterial hypoxemia, up to 50% of the blood C-14-labeled carbon monoxide shifted into extravascular tissue. (Author abstract modified)

4415 APTIC NUMBER 13563

MacPherson, Peter and John K. Davidson
CORRELATION BETWEEN LUNG ASBESTOS COUNT AT NECROPSY AND RADIOLOGICAL APPEARANCES. Brit. Med. J. (London), 1:355-357. Feb. 1969. 14 refs.

An attempt was made to correlate the asbestos count on histological section with the pulmonary radiographic findings, in order to discover if there is a level at which evidence of asbestosis becomes discernible on a chest radiograph. The survey is concerned with the radiological appearances of the first 100 of a series of 600 necropsies in which a chest radiograph had been found to be positive in 44 and negative in 56 of the cases. Radiological evidence suggestive of asbestosis was found in 8 of the 44 cases with positive counts and in only one of the group with negative counts. As expected, the higher the asbestos count, the greater the likelihood of positive radiographic features. Such changes were present in eight of the nine cases in which the count exceeded 40. The most common radiographic findings were the noncalcified pleural plaque on the lateral chest wall and calcified diaphragmatic pleural plaques.

4416 APTIC NUMBER 13651

Markaryan, D. S., R. N. Mandzhgaladze, and V. I. Vashakidze
MUTAGENIC PROPERTIES OF MANGANESE COMPOUNDS AND CERTAIN PESTICIDES. (K voprosu o mutagennykh svoystvakh margantsevykh soyedineniy i nekctorykh pestitsidov). Text in Russian. Soobshch. Akad. Nauk Gruz. SSR, 41(2):471-475, 1966. 4 refs.

Mutagenic properties of the following compounds were studied: (1) manganous sulfate, (2) manganous chloride, (3) naphthyl-N-methylcarbonate, (4) granozan (technical mixture of 2.5% C2H5HgCl, 96-97% talc, and 0.6% mineral oil), (5) zoocoumarin (technical mixture of 0.5% zoocoumarin and 99.5% starch), and (6) tobacco dust. Experiments with rats given single sublethal intraperitoneal doses revealed increased cytogenic disturbance in bone marrow cells 24 hrs after poisoning with (1), (2), (4) and (6). The mutagenic effect of (3) is undetermined, and (5) may even have antimutagenic properties.

4417 APTIC NUMBER 13137

McClenahan, James B., Rowena Mussenden, and Joel D. Ohlsen
EFFECT OF ETHANOL ON SURFACTANT OF VENTILATED LUNGS. J. Appl. Physiol., 27(1):90-95, July 1969. 13 refs.

Fresh, excised dog lungs were ventilated at greater than tidal volume with air, using a positive-pressure respirator with a conventional nebulizer and saline. These lungs showed an increased stiffness (decreased compliance). After ventilation for 2 hrs, the lungs were ventilated for 20 min with an ultrasonic nebulizer using saline or 95% ethanol. With saline, the lungs remained stiff; after ethanol, the stiffness decreased toward the initial value. Other fresh dog lungs, ventilated with the ultrasonic nebulizer and saline for 30 min, showed a marked decrease in volume and compliance. In dog lungs similarly ventilated with 95% ethanol for 1 hr, significantly less change in volume or loss of compliance occurred. The saline-filled pressure-volume curve after ventilation with a conventional nebulizer was normal, indicating no increased tissue stiffness. Ventilated rat lungs exhibiting decreased compliance were washed with saline. The surface activity of the wash fluid was low. After exposure to ethanol, the surface activity of the wash fluid returned to normal. These studies suggest that the activity of surfactant modified by ventilation is restored by ethanol. The mechanism is discussed. (Author abstract modified)

4418 APTIC NUMBER 13058

Menet, Jean-Paul and Edmond Lagarde
EFFECTS OF ATMOSPHERIC OZONE ON THE BACTERIAL POPULATIONS OF A SUBANTARCTIC BIOTOPE. (Effets de l'ozone atmospherique sur les peuplements bacteriens d'un biotope subantarctique). Text in French. Compt. Rend. Acad. Sci. Ser. D. (Paris), 267:2041-2043, Dec. 4, 1968. 7 refs.

Aerobic bacterial populations were determined in samples of pond water taken near Port aux Francais in the Kerguelen Islands at which high ozone levels have been recorded for several years. One series was exposed to the ambient air, the other protected by rubber stoppers. The series exposed to atmospheric ozone (varying from approximately 300-550 milli-atmos cm over a year's period) had lower bacterial counts than the series protected from ozone in 70% of the samples. Destruction attributable to ozone varied from 7-100% with an average of about 40%. The amount of destruction was directly related to increase in the ozone concentration.

4419 APTIC NUMBER 13940

Miura, Toyohiko
SOME CONSIDERATIONS OF THE THRESHOLD LIMIT VALUES OF ATMOSPHERIC DUST CONCENTRATION. (Kukichu funjin no kyoyo ndo ni kansuru 2, 3 no koso). Text in Japanese. Rodo Kagaku (J. Sci. Labour, Tokyo), 45(2):55-68, 1969. 62 refs.

Recommended threshold limit values (TLV) of airborne dust concentrations are reviewed. Prior to World War II the maximum allowable concentration of dust recommended by Japanese scientists was 400 particles per cc. In 1954 the Committee on the Threshold Limit of Atmospheric Dust Concentration recommended the following values: 400 particles per cc, or 8 mg/cc, for dust above 10% free silica content; 1000 particles per cc, or 20 mg/cc, for dust below 10% free silica content. In 1958, the Ministry of Labor recommended the following TLVs for dust control in industries and mining: 700 per cc, or 14 mg/cc, for dust above 50% free silica content; 1000 per cc, or 20 mg/cc, for dust below 50% free silica content. In 1968 the Japan Association of Industrial Health suggested these revised values: 2 mg/cc for dust with content above 30% free silica, dust of talc, pyrophylite, aluminum, alumina, diatomaceous earth, pyrite, and asbestos; 5 mg/cc for mineral dust with content below 30% free silica, dust of iron oxide, graphite, carbon black, active carbon, and coal. The TLV recommended by the American Conference of Governmental Industrial Hygienists for high free silica content dust is 1/10 of the TLV for inert dust. In the USSR 1 mg/cc is the recomended maximum allowable concentration for dust with a free silica content above 70%. This value is 1/5 of that of dust below 10% free silica content. Suggested methods for determining airborne dust concentration include the German 'Maximale Arbeitsplatzkonzentration(MAK)' and 'Z-Wert' procedures. Use of the Personal Dust Sample of the Poken (Institute for Science and Labor) type is also advocated.

4420 APTIC NUMBER 12987

Moese, J. R., H. Brantner, and G. Fischer
AIR POLLUTION STUDIES IN THE GRAZ AREA. 3. INVESTIGATIONS OF THE CORRELATION AND MEANING OF FLUORIDE EMISSION AND FLUORIDE EXCRETION IN THE KIDNEY. (Studien uber die Luftverunreinigung im Raum Graz. 3. Mitt.: Untersuchungen uber Zusammenhang und Bedeutung von Fluoremissionen und Fluorausscheidung in Harn). Text in German. Arch. Hyg., 153(2):114-118, April 1969. 7 refs.

Fluoride excretion in the urine was determined in population groups living in various industrial areas of the city of Graz, Austria. A total of five groups was selected. The first group consisted of workers in a brickyard outside the residential area of Graz. The workers resided in the immediate vicinity of the brickyard. The second group included workers in this brickyard who lived in the country. The third group (control group) lived and worked outside the region of the brickyard. The fourth group included members of a shoe factory in the industrial center of Graz. The last group consisted of persons living in a nearby resort remote from any industries. The highest amount of fluoride was found in the first group, the lowest in the group from the resort town of St. Radegund. Thus, a marked correlation between fluoride excretion and the degree of air pollution could be found. The concentrations found in the fourth group were markedly higher than those in the third group, due to industrial emissions and domestic heating. In none of the groups did the concentration reach the level of acute intoxication. Nevertheless, such groups should receive special

attention in such programs as caries prevention by distribution of fluorine-containing tablets.

4421 APTIC NUMBER 12971

Pashchenko, V. P.
EFFECT OF HYDROGEN SULFIDE AND METHYL MERCAPTAN ON THE ADENOSINE TRIPHOSPHATASE OF ANIMAL ORGANS. (Vliyaniye serovodoroda i metilmerkaptana na aktivnost' adenozintrifosfataz organov zhivotnykh). Text in Russian. Gigiena Truda i Prof. Zabolevaniya, no. 4:58, 1969.

Adenosine triphosphatase cultures grown in extracts from various organs (brain, skeletal muscle, liver, kidney, lung, heart, spleen), as well as in vitro studies with mice and rats given chronic and repeated subchronic inhalation exposure to hydrogen sulfide and methyl mercaptan were used to determine the enzyme activity. Hydrogen sulfide showed only a slight inhibiting effect on adenosine triphosphatase activity; methyl mercaptan had a more pronounced effect. Increased enzyme activity in the brain and spleen was detected with chronic doses of methyl mercaptan.

4422 APTIC NUMBER 12283

Pazynich, V. N.
EXPERIMENTAL BASIS FOR THE DETERMINATION OF MAXIMUM ALLOWABLE CONCENTRATION OF VANADIUM PENTOXIDE IN ATMOSPHERIC AIR. In: The Biological Effects and Hygienic Importance of Atmospheric Pollutants, Book 10. Translated from Russian by B. S. Levine, U.S.S.R. Literature on Air Pollution and Related Occupational Diseases, Vol. 17, pp. 128-138, 1966.
CFSTI: PB 1805221

A study was initiated to establish a hygienic basis for the determination of the maximum allowable average-daily concentration of vanadium pentoxide aerosol in atmospheric air. In this study, rats were exposed to the inhalation of vanadium pentoxide continuously for 70 days. The rats' condition before, during and after experimental inhalation was recorded on the basis of their general condition, body weight, motor chronaxy of the antagonist muscles, blood cholinesterase activity, total protein, blood serum protein fractions, oxyhemoglobin in venous blood, and luminescence of blood leucocytes. At the end of the inhalation period rate of oxygen absorption in granulated liver tissue was determined by a Warburg device; a pathological examination of some internal organs was also made. From the data obtained, it was concluded that: chronic, 24-hour, 70-day inhalation by rats of air polluted with a Vanadium Pentoxide aerosol concentration of 0.017 mg/cu m induces substantial changes in the functional state of the organism. A concentration of 0.006 mg/cu m produced slight functional changes. A Vanadium Pentoxide aerosol concentration of 0.002 mg/cu m proved inactive. On the basis of this investigation it is recommended that the maximum average-daily allowable concentration for Vanadium Pentoxide aerosol in atmospheric air be set at 0.002 mg/cu m.

4423 APTIC NUMBER 13140

Pedersen, E., K. Magnus, T. Mork, A. Mougen, et al.
LUNG CANCER IN FINLAND AND NORWAY AN EPIDEMICLOGICAL STUDY. Acta Pathol. Microbiol. Scand., Suppl. 199, 74p., 1969. 23 refs.

Investigations were conducted to examine the large differences in lung cancer incidence among males in Finland and Norway. An interview study was carried out in a sample of 4602 males in Finland and 4092 in Norway, aged 45-64, covering smoking habits, previous respiratory diseases, occupational history, and sauna habits. An air pollution survey was concurrently conducted in Helsinki and Oslo. Results placed heavy emphasis on cigarette smoking as a factor in lung cancer incidence. Of the former and present smokers studied in Finland, 59% smoked only cigarettes, while in Norway, 22% smoked only cigarettes. Air pollution survey results showed all components determined were of higher concentration in Oslo than in Helsinki, and seasonal variations were more pronounced in Oslo. In both countries the presence of respiratory symptoms was higher among current cigarette smokers than among non-smokers, and the prevalence increased with the amount smoked. The excess incidence of lung cancer was much smaller for Helsinki than for rural areas, compared with corresponding regions in Norway. It was concluded that whatever effects air pollution may have on lung cancer, they seem to be outweighed by the effect of differences in smoking habits.

4424 APTIC NUMBER 12955

Peters, John M., Jere Mead, and Willem F. Van Ganse
A SIMPLE FLOW-VOLUME DEVICE FOR MEASURING VENTILATORY FUNCTION IN THE FIELD. RESULTS ON WORKERS EXPOSED TO LOW LEVELS OF TOLUENE DIISOCYANATE. Am. Rev. Respirat. Diseases, 99(4):617-622, 1969. 10 refs.

A new, simple, portable device for measuring the maximum expiratory flow-volume (MEFV) curve was discussed. The ventilatory capacity of 35 workers exposed to toluene diisocyanate was assessed with this device. Measurements were made on Monday morning and afternoon, and on Tuesday morning. The results showed a significant qualitative and quantitative depression of the MEFV curve during the working day which did not return to baseline levels on Tuesday morning. This device is well suited for survey work in the field and is particularly useful when serial measurements of the same individual are made. (Author summary modified)

4425 APTIC NUMBER 13421

Potzl, Karl
RESPIRATORY SYSTEM MODEL ANALYZES AIR POLLUTANTS. (Atemtraktmodell analysiert Luftverunreinigungen). Text in German. Umschau, 68(24):757-8, Nov. 1968. 2 refs.

Suspended particles are generally heterogeneous mixtures of chemically and physically differing compounds. In addition, they vary greatly in size. Any study of the effects of such particles on humans must start with the respiratory tract, since this is practically the only way for particles to enter

human beings. To facilitate determining the concentration and all physical and chemical properties of the various components, a model was developed which also permits determination of the extent of particle retention in the various parts of the respiratory tract. The model comprises four filters connected in series with staggered retention properties which draw in a measured amount of the particle-laden air. The four filters rest on wire nettings isolated by Teflon disks which measure and record the electric charge of the retained particles. The four filters are designed to retain particles from 0.02 to 6 micrometers in the trachea, bronchi, alveoli, and at exhalation. The results of measurements showed retention of SiO2 particles from a metallurgical plant mainly in the trachea and bronchi, while only a minimum amount is retained in the alveoli. In contrast, SiO2 from a mixture of suspended particles in a cement factory was mainly retained in the alveoli.

4426 APTIC NUMBER 12961

Rohde, W.
IMPORTANCE OF VIROLOGICAL STUDIES OF AFACTERIAL INFECTIOUS DISEASES OF THE EYE. I. INVESTIGATIONS OF REGIONAL EPIDEMIC KERATOCONJUNCTIVITIS FROM 1950-1960 IN THE GLAUCHAU AREA. (Bedeutung und Signifikanz gezielter virologischer Untersuchungen bei abakteriellen infektiosen Erkrankungen des Auges. I. Untersuchungen uber regionale epidemische (Kerato-) Konjunktivitis 1950-1960 im Raume Glauchau). Text in German. Arch. Hyg., 153(1):72-80, Feb. 1969. 29 refs.

In Glachau, Saxony (East Germany) and the surrounding industrial area, there are bioclimatic conditions which make the population particularly prone to infectious eye diseases. Environmental influences include waste gases from the spinning and textile industry, as well as the chemical and pharmaceutical industrial complexes. Temperature inversions are frequent in this area, so that the waste gases laden with formaldehyde, ammonia, mono-, di-, and trimethylamines, H2S, CS2, and sometimes also fluorine, cannot disperse. These pollutants irritate the epithelium of the connective tissue of the eye. Thus the eyes become susceptible to all sorts of infectious diseases, which usually begin among the workers and then spread to the rest of the population. Over the last ten years, at least three waves of infectious eye diseases swept the area. During the first epidemic in 1954/55, keratoconjunctivitis was diagnosed. Gradually the population became immune to this virus. Between 1959 and 1961, follicular conjunctivitis caused by Adenovirus 3, afflicted the majority of the population. In the epidemic of 1963/64, it was observed that all diseases started with follicular conjunctivitis, but in the further course of the epidemic, opthalmologists found cytoplasmic bodies and virus conolies in the epithelium, symptoms which clearly had nothing to do with keratoconjunctivitis. Size and morphology of the cytoplasmic bodies indicated Bedsonien. Thus, in addition to Adenovirus 3, 7, and 11, Bedsonien can also give rise to a clinical picture very similar to that of epidemic keratoconjunctivitis.

4427 APTIC NUMBER 12582

Rubay, M.
ABOUT THE FOG OBSERVED IN THE MEUSE VALLEY IN DECEMBER 1930 AND ITS NOXIOUS EFFECTS ON ANIMALS. ((Apropos du brouillard observe dans la vallee de la Meuse en Decembre 1930 et de ses effets nocifs chez les animaux.)) Text in French. Ann Med Veterinaire, 77:97-110, March 1932.

During the grave accident of December 1930 in the industrial region of the Meuse Valley, hundreds of persons were affected, 65 of them died, and many heads of cattle were saved only by rapid evacuation. In this area, the river flows down a straight valley, 30 km long, 1 km wide, surrounded on both sides by steep hills 100 meters high. In this valley, many factories pour into the air intense smoke, dusts, and such products as sulfur dioxide, sulfuric, hydrochloric, hydrofluoric, sulfhydric, nitrous and nitric acids, carbon monoxide, ammonia, chalk and cement dusts, arsenic tricxide, etc. Vegetation and cattle were known to suffer from these conditions, notably in 1897, 1902, and 1911 ("fog disease"). Grave accidents have always occurred in cold, foggy winter weather in absence of any strong winds when this prevented the polluted air from rising out of the valley. Examination of affected animals, as well as their owners' reports, show respiratory troubles to have occurred on the second day and increased rapidly, with accelerating pulse, terminating in asphyxia. Most animals were saved by being removed from the area, but some died 8 to 12 days after the incident, with swelling of the belly. Stoppage of milk production and emphysema were also observed. Portmortem examinations of two cows brought forth lesions of the nose, respiratory tracts, and lungs, some damage to the heart, discoloration of the liver, no damage to the spleen.##

4428 APTIC NUMBER 12583

Rubay, M.
ABOUT THE ACCIDENTS CAUSED BY FOG IN THE MEUSE AREA. ((Au sujet des accidents produits par le brouillard dans la region de la Meuse.)) Text in French. Ann. Med. Veterinaire, 77:390-391, 1932.

This article briefly describes the topics discussed at a meeting. The Dean reports on the December 1930 accident during which 65 persons and many heads of cattle died (reference is made to his article in the "Annales" of March-April 1932). Mr. Migeotte refers to his World War I experience with horses and gas victims, and cannot correlate their cardiac and respiratory systems with fog-sickness symptoms of young cattle in 1929. Answering Mr. Hendrick, Mr. Boyer states that, in 1911, subcutaneous emphysema appeared in animals after 2 days of fog, but not in man. Mr. Hendrick, attributes to anatomical differences in lung tissues the fact that cattle are more vulnerable than horses to fog disease, and that death is caused by early lung rupture. Poes and Boyer mention a slight fever in some victims. Hauben cities the case of a horse with cough and irregular breathing. Hauben and Snollaerts imply that, in the area of Vilvorde, rickets is a local sickness which cannot be attributed to factory fumes that prevail in damp and humid weather.##

4429 APTIC NUMBER 12978

Russell, J. C., E. W. McChesney, and L. Goldberg
REAPPRAISAL OF THE TOXICOLOGY OF ETHYLENE GLYCOL. I. DETERMINATION OF ETHYLENE GLYCOL IN BIOLOGICAL MATERIAL BY A CHEMICAL METHOD. Food Cosmet. Toxicol. (London), 7(2):107-113, March 1969. 13 refs.

A colorimetric method is described for the determination of ethylene glycol in biological materials. A protein- and carbohydrate-free filter is prepared and oxidized with periodate, and the formaldehyde produced is converted to a dihydrolutidine derivative. Recoveries of glycol from urine, serum, and tissues by this procedure are virtually quantitative, with a precision of = or - 3 to 4%. Samples of human urine analyzed by this method gave blank values averaging 5 to 6 mg/100 ml. Tissue blanks varied from 52 mg/100 g for liver to 1 mg/100 g for muscle. If a pre-exposure blank is established, as little as 5 mg glycol/100 ml urine or 3 mg/100 ml blood should be measurable. A major advantage of the method is the elimination of interference by metabolites of ethylene glycol.

4430 APTIC NUMBER 12282

Sadilova, M. S.
STUDIES IN THE STANDARDIZATION OF MAXIMUM ALLOWABLE HYDROGEN FLUORIDE CONCENTRATIONS IN THE AIR OF INHABITED AREAS. In: The Biological Effects and Hygienic Importance of Atmospheric Pollutants, Book 10. Translated from Russian by B. S. Levine, U.S.S.R. Literature on Air Pollution and Related Occupational Diseases, Vol. 17, pp. 118-128, 1968.
CFSTI: PB 180522T

An investigation of the levels of atmospheric fluorine found near aluminum and cryolite plants, accompanied by a survey of the health of children who live in these areas has shown that the establishment of the maximum allowable concentration of fluorine is imperative. A series of tests made on human subjects and animals exposed to hydrogen fluoride yielded the following information: The odor perception threshold and the threshold of reflex action of HF in the human organism are both 0.03 mg/cu m. Five-month experimental inhalation of HF in concentrations of 0.10 and 0.03 mg/cu m produced many changes in warm-blooded animals: (a) inhibition in the central nervous system, the higher concentrations leading to irreversible destructive changes in the nerve cells; (b) a change in calcium phosphate metabolism; (c) F accumulation in the bones; and (d) histomorphological changes in teeth, bones, and internal organs. It was found that the extent of the changes varied with the HF concentration in the inhaled air. An HF concentration of 0.01 mg/cu m produced no changes in the experimental animals. Finally, the investigation showed that: (a) an HF concentration of 0.15 mg/cu m cannot be regarded as threshold of odor perceptive concentrations; (b) an HF concentration of 0.03 mg/cu m cannot be taken for the maximum allowable single-exposure concentration; (c) the maximum single-exposure concentration of HF must not exceed 0.02 mg/cu m.

4431 APTIC NUMBER 13846

Sapse, A. T., P. Bonavida, W. Stone, Jr., and E. E. Sercarz
HUMAN TEAR LYSOZYME III. PRELIMINARY STUDY ON LYSOZYME LEVELS IN SUBJECTS WITH SMOG EYE IRRITATION. Am. J. Ophthal., Vol. 66:76-80, July 1968. 11 refs.

Human tear lysozyme (HTL) levels were measured in 21 subjects complaining of eye irritation while in smog-polluted areas of Los Angeles, primarily the San Fernando Valley and Azusa. Later, tear specimens collected from 12 patients were compared to those taken from the same patients after an interval of several hours in a pollution-free, air-conditioned room. HTL content in subjects with eye irritation was found to by 60% below normal. Under smog-free conditions, HTL levels were about 60% higher than normal. The reason for the decrease is unknown but may be attributed to several possibilities: (1) the total protein may have decreased due to the increased flow in tears, (2) HTL may be removed from the eye fluids either from destruction or binding to the tissues, or (3) smog or fumes may have inhibitors which inactivate HTL.

4432 APTIC NUMBER 12277

Sayfutdinov, M. M.
EXPERIMENTAL DATA PROPOSED FOR THE DETERMINATION OF MAXIMAL ALLOWABLE AMMONIA CONCENTRATION IN ATMOSPHERIC AIR. In: The Biological Effects and Hygienic Importance of Atmospheric Pollutants, Book 10. Translated from Russian by B. S. Levine, U.S.S.R. Literature on Air Pollution and Related Occupational Diseases, Vol. 17, pp. 67-76, 1968.
CFSTI: PB 180522T

Air quality studies near several industries, especially metallurgical plants having coke oven gas and nitrate operations on the premises showed that these were the chief sources of atmospheric air pollution with ammonia. Investigations conducted with workers and with laboratory animals led to the conclusion that the subthreshold ammonia concentration which had no affect on the cerebral cortex biopotentials is at the 0.2 mg/cu.m level, which can be regarded as its maximal allowable single concentration in atmospheric air. Under conditions of chronic inhalation exposure such a concentration proved toxicologically inactive. On this basis such ammonia concentration can be recommended as its maximal allowable limit in atmospheric air.##

4433 APTIC NUMBER 13643

...ith, Roger P. and W. Robert Layne
A COMPARISON OF THE LETHAL EFFECTS OF NITRITE AND HYDROXYLAMINE IN THE MOUSE. J. Pharmacol. Exptl. Therap., 165(1):30-35, 1969. 19 refs.

Hydroxylamine hydrochloride injected i.p. is more acutely toxic to mice than sodium nitrite injected i.p.; but when given in equal sublethal doses, the two chemicals generate equivalent peak levels of methemoglobin. Peak levels of methemoglobin are

reached in 10 min or less after hydroxylamine, and animals die with the same time period. Death is delayed after nitrite and correlates in time with the more delayed peak methemoglobin formation. A nitric-generated methemoglobinemia persists longer than a hydroxylamine-generated methemoglobinemia both in mice and in mouse erythrocyte suspensions, but the effect of methylene blue in attenuating the methemoglobinemic response is more dramatic in the case of nitrite. Hydroxylamine further differs from nitrite in that the former has a greater tendency to produce 'sulfhemoglobin-like' pigments. Pretreatment of mice with methylene blue significantly protects them against death by either nitrite or hydroxylamine. L-Arginine does not alter significantly the methemoglobinemic response to hydroxylamine, and yet it protects mice against death by hydroxylamine but not by nitrite. These results are inconsistent with the interconversion of nitrite and hydroxylamine in mice or in mouse red cells. (Author abstract)

4434 APTIC NUMBER 13131

Solomon, William R.
AN APPRAISAL OF RUMEX POLLEN AS AN AEROALLERGEN. J. Allergy, 44(1):25-36, July 1969. 13 refs.

Particle concentrations derived from operation of a rotobar sampler at a midwestern location during 1965 to 1968 have confirmed the regular and substantial occurrence of Rumex pollen. Field studies have implicated Rumex acetosella (sheep sorrel) as the primary source. Comparisons of rotobar and gravity slide data suggest that purely aerodynamic factors may decrease the recovery of Rumex pollen by the Durham sampler by as much as 50% relative to grass pollen. A high frequency of positive skin reactivity to Rumex pollen extract was noted among 367 persons demonstrating some wheal and flare reactions on skin testing with extracts of common inhalant allergens. More than half of a group of positive skin reactors to Rumex extract also demonstrated positive nasal provocative tests with this material. Most, but not all, positive nasal reactors to Rumex had experienced pollinosis during the common period of Rumex and grass pollen prevalence, and at least some of these manifested negative responses on mucosal testing with grass pollen extracts. The combined aerobiological and clinical data suggest that specific sensitivity to Rumex pollen may contribute significantly to the severity of pollinosis in selected patients. (Author abstract modified)

4435 APTIC NUMBER 13167

Stanescu, Dan C. and Dan P. Teculescu
EFFECT OF ACETYLCHOLINE AEROSOLS ON DIFFUSING CAPACITY IN ASTHMATIC AND NORMAL SUBJECTS. J. Appl. Physiol., 26(2):197-202, Feb. 1969. 25 refs.

Nine patients with bronchial asthma and five healthy subjects were subjected to inhalation of 1% and 5% acetylcholine aerosols in order to determine the effect of the acetylcholine on lung diffusing capacity using the CO breath-holding method. Acetylcholine inhalation resulted in the appearance of symptoms of asthma attack (dyspnea, wheezes, rhonchi) in all subjects. A transient increase in residual volume occurred in all subjects and reached initial values 12 min after acetylcholine nebulization; alveolar volume was practically unchanged in all but three cases. A significant decrease of pulmonary diffusing capacity (DL sub CO) and in permeability of the lung for CO (K sub CO) was found in eight asthmatic patients and three normal subjects a few minutes after acetylcholine inhalation. In most cases, these alterations vanished 10 to 12 min later, despite persistent decrease of forced expiratory volume at 1 sec. The decrease of DL sub CO and K sub CO can be the result of a true impairment of diffusion or a regional unevenness of function throughout the lung.

4436 APTIC NUMBER 13837

Steinegger, S.
ENDEMIC SKIN LESIONS NEAR AN ALUMINUM FACTORY. Fluoride Quarterly. J. Intern. Soc. Fluoride Res., 2(1):37-39, Jan. 1969. 6 refs.

Numerous cases of endemic skin lesions were encountered in children living near Chivzela, Italy, and were attributed to air pollution from a neighboring aluminum factory. The lesions, consisting of grayish-brown to blue patches 1 to 2 cm in diameter, are fleeting in character. After they fade, new ones appear on other parts of the body. None can be identified historically with any trauma. All are readily differentiated from suffusion because their bluish color does not gradually change to yellow during the healing stage. Between June 20 and September 1967, 72 cases were encountered in kindergarten pupils. They occur less frequently in women. Up to September 1967, none had been encountered in men. When the children were temporarily removed from the area, the lesions cleared up promptly. Endemically, the lesions are confined to the area where farmers have reported damage to livestock and vegetation. This suggests that fumes or particulate matter emanating from the aluminum factory are responsible for the condition.

4437 APTIC NUMBER 13626

Sterner, James H.
CONTRIBUTION OF OCCUPATIONAL HEALTH TO THE SOLUTIONS OF ENVIRONMENTAL HEALTH PROBLEMS. J. Am. Med. Assoc., 208(7): 1173-1176, May 19, 1969. (Presented at the 28th annual Congress on Occupational Health, AMA, New York, Sept. 30, 1968.)

A survey is presented of the significant ways in which people, concepts methodology, and tools from occupational health have played an essential role in control and evaluation of environmental health problems. The most important contribution to the evaluation and solution of environmental health problems is the threshold limit concept, developed initially and widely applied in occupational health, which deals with the quantitative relation between biological systems and exposure to noxious physical and chemical agents. Another major contribution by occupational health deals with assessing the effects of pollution on general populations. Epidemiological studies attempting to assess the

effects from air pollutants and from ionizing radiation at the levels of exposure currently found in the community have failed due to the lack of specificity of the biological parameters and the infringement of other potentially hazardous agents on the same population. Studies of industrial populations with slightly greater exposure levels offer a more practical and more promising method for conducting epidemiological studies.

4438 APTIC NUMBER 13168

Stoeckle, John D., Harriet L. Hardy, and Alfred L. Weber
CHRONIC BERYLLIUM DISEASE. LONG-TERM FOLLOW-UP OF SIXTY CASES AND SELECTIVE REVIEW OF THE LITERATURE. Am. J. Med., 46(4): 545-561, April 1969. 77 refs.

Toxicity of beryllium was recognized as an acute disease before it was recognized as a chronic disease. The latter often developed long after exposure to beryllium had ceased. It is characterized by a granulomatous interstitial pneumonitis, but frequently other tissues such as the skin, liver, lymph nodes, and muscle are also involved. In the United States, 535 cases of chronic beryllium disease were reported in 1966. The paper contains sections on clinical observations, roentgenologic reactions, treatment, disability, and mortality. Diagnosis is based on two sets of criteria, one epidemiologic, the other clinical. The epidemiologic criterion is a significant beryllium exposure, namely, an exposure to beryllium or its toxic compounds, also one which has produced similar illness in others. The clinical criteria include (1) diffuse densities on roentgenograms, (2) patterns of respiratory insufficiency initially characterized by a reduction in lung volumes and/or 'diffusion capacity', (3) interstitial pneumonitis, determined by lung biopsy or autopsy specimens, (4) systemic toxicity demonstrated by functional or pathologic abnormalities in tissues other than lungs, and (5) beryllium in tissues. A diagnosis consists of significant exposure and the presence of at least the first two clinical criteria. Although determination of beryllium in tissue provides additional evidence of exposure to the etiologic agent, it is not an essential diagnostic criterion.

4439 APTIC NUMBER 13888

Tala, P., H. Poppius, P. Siltanen, and A. Heinonen
TRANSFER FACTOR FOR CARBON MONOXIDE BEFORE AND AFTER SURGICAL CORRECTION OF ATRIAL SEPTAL DEFECT. Ann. Chir. Gynaecol. Fenniae, 57(2):175-178, 1968. 12 refs.

Twelve patients with atrial septal defect and four with patent ductus arteriosus were subjected to measurements of the transfer factor (Tl) for carbon monoxide (or the diffusing capacity of the lung) in upright and supine position. The preoperative Tl values were found to be elevated in the cases with atrial septal defect, and the normally occurring increase in transfer factor following postural change from upright to supine was slight or absent in them. The Tl value decreased postoperatively by one-fourth on the average, when measure 9-16 weeks after surgery. (Author summary)

4440 APTIC NUMBER 12281

Tkach, N. Z.
COMBINED EFFECTS OF LOW ACETONE AND ACETOPHENONE CONCENTRATIONS IN THE AIR OF THE LIVING ORGANISM. In: The Biological Effects and Hygienic Importance of Atmospheric Pollutants, Book 10. Translated from Russian by B. S. Levine, U.S.S.R. Literature on Air Pollution and Related Occupational Diseases, Vol. 17, pp. 108-117, 1968.
CFSTI: PB 180522?

The effects of low acetone and acetophenone concentrations on the living organism were determined. Both poisons attack principally the central nervous system. The odor perception threshold concentration was determined, using the most sensitive test persons, for acetone, for acetophenone and for a mixture of these two compounds. The functional state of the central nervous system was determined by the eye sensitivity to light method. Also included was a study of the effect of subthreshold acetone and acetophenone concentrations jointly on the electrical cerebrocortical activity by the alpha rhythm method. Data from these three studies led to the following conclusions: (1) On the basis of odor perception threshold, the minimum perceptable acetone and acetophenone concentrations individually should be, 1.096 and 0.01 mg/cu m respectively. (2) Where acetone and acetophenone are simultaneously present in an air sample, the intensity of their combined odors is subject to simple summation. (3) The reflex effect of acetone and acetophenone in simultaneous combination on eye sensitivity to light and on electrical brain activity can be expressed in terms of complete summation. A study made on the resorptive effects showed that, chronic 24-hour exposure of rats to inhalation of a mixture of acetone and acetophenone the fractional concentrations summation index of which is equal to 10.9 will bring about functional shifts in the organism of these rats expressed as a lowering in the muscle antagonist chronaxy control by the central nervous activity, in the central control of cholinesterase activity of the blood, will enhance the rate of coproporphyrin elimination via the urine, and will give rise to many nonspecific reactions originating in the kidney cortex. Finally, the maximal 24-hour fractional concentrations summation index of acetone and acetophenone simultaneously present must not exceed 1.5.

4441 APTIC NUMBER 12274

Ubaydullayev, R.
ATMOSPHERIC AIR POLLUTION WITH VAPORS OF HYDROLYTIC ALCOHOL AND ITS EFFECT ON THE ORGANISM. In: The Biological Effects and Hygienic Importance of Atmospheric Pollutants, Book 10. Translated from Russian by B. S. Levine, U.S.S.R. Literature on Air Pollution and Related Occupational Diseases, Vol. 17, pp. 46-54, 1968.
CFSTI: PB 180522?

The present study showed that the thresholds of ethanol odor perception in most sensitive persons was 7.1 mg/cu m; eye sensitivity to light was 6.97 mg/cu m; and of reflex effect on cerebral cortex activity 6.1 mg/cu m. The maximum inactive or

subthreshold concentration in most sensitive persons was 4.9 mg/cu m. It is recommended that the maximum allowable single concentration of hydrolytic ethyl alcohol in atmospheric air be set at the 5 mg/cu m level. Chronic, 24-hr, 90-day inhalation by experimental rats of air containing ethanol vapor in 29.25 mg/cu m concentration affected the flexor extensor muscle chronaxy ratio, the cholinesterase activity, the rate of coproporphyrin elimination in the urine, and the ratios of blood-serum protein fractions. A 5.59 mg/cu m ethanol concentration had no effect on the organism. Results of chronic experiments with rats indicated that the maximal allowable average 24-hr. ethanol vapor concentration in atmospheric air can be set at 5 mg/cu m. Experimental techniques are presented in full. (Author's conclusion, modified)##

4442 APTIC NUMBER 13147

Weiner, Betsy P. and Robert M. Worth
INSECTICIDES. HOUSEHOLD USE AND RESPIRATORY IMPAIRMENT. Hawaii Med. J., 28(4):283-285, March-April 1969. 7 refs.

Chronic exposure to household insecticides and a history of asthma, chronic bronchitis, and sinusitis are linked in data from a random sample of people on Oahu, Hawaii. A blind follow-up study of a subsample of this population two years later reveals significant correlation between frequent use of insecticides and respiratory impairment as measured by spirometry. Excluding cigarette smokers strengthens this comparison. Exposed persons also have significantly more respiratory symptoms. (Author abstract)

4443 APTIC NUMBER 13139

Weitzman, Donald O., Jo Ann S. Kinney, and S. M. Luria
EFFECT ON VISION OF REPEATED EXPOSURE TO CARBON DIOXIDE. Naval Submarine Medical Center, Groton, Conn., Submarine Medical Research Laboratory, Proj. MF 12.524.004-9015D.01, SMRL-R-566, 6p., Feb. 14, 1969. 7 refs.

Investigations were conducted to evaluate the effects on visual function of repeated exposure to low levels of carbon dioxide. Exposure of CO2 varied cyclically from 0.03 (normal air) to 3%, at 1 atm every 24 hours for a period of six days. A battery of visual tests was administered during this period and in control periods both before and after the exposure to CO2. Breathing 1.5% of CO2 in air resulted in some impairment of night vision sensitivity and in green color sensitivity. The impairment is associated with concentrations of CO2 which have commonly been regarded as innocuous. All other visual functions remained normal.

4444 APTIC NUMBER 13710

Whitlock, C. M., Jr., S. J. Amuso, and J. E. Bittenbender
CHRONIC NEUROLOGICAL DISEASE IN TWO MANGANESE STEEL WORKERS. Am. Ind. Hyg. Assoc. J., vol. 27:454-459, Sept./Oct. 1966. 13 refs.

Most reported cases of manganese poisoning are associated with manganese mine ore-crushing and processing plant workers. Manganese intoxication is a rarity among manganese steel factory workers but two cases were encountered and treated at the Polyclinic Hospital in Harrisburg. The previously unreported finding of extensor plantar responses in manganese intoxication is described. Both men were employed in an electric arc burning operation for cleaning manganese castings, a process leading to the formation of metallic fumes on the castings. Each showed signs of extrapyramidal disease, and urine assays suggested accumulation of manganese in the workers. A survey of the work site showed manganese in concentrations as high as 4.5 to 4.7 mg per cu meter. Both patients improved remarkably after removal from manganese exposure and treatment with calcium disodium ethylenediaminetetraacetate. The rise in urinary concentration of manganese noted during treatment indicates that this chelating agent combines with manganese and removes it from the body. It is suggested that the present threshold limit for manganese of 5 mg/cu m provides relatively no safety factor. This point is disputed in a brief discussion by H. E. Whitman and A. D. Brandt of Bethlehem Steel Corp. There has been no evidence of manganese poisoning among Bethlehem Steel workers exposed to 5 mg/cu m on an eight-hour daily weighted-average basis.

4445 APTIC NUMBER 12167

Whittenberger, James and Robert Frank
HUMAN EXPOSURES TO SULFUR DIOXIDE. Preprint, Harvard School of Public Health, Boston, Mass., Department of Physiology, p. 15-19, 1961. 8 refs. (Presented at the Proceeding Air Pollution Medical Research Conference, Los Angeles, Calif., Dec. 4, 1961.)

A study was made, with human subjects, of the changes in the resistance of the lungs in response to low levels of sulfur dioxide. The esophageal pressure was used as an index of pressure changes in the thorax, and a volume displacement plethysmograph was used for the recording of volume and flow. Measurements were made continuously while the subject was breathing SO2, and during 10 min. of recovery. The level of SO2 was varied around an average of 1 ppm, 5 ppm, and 13 ppm. A definite dose-response relationship was observed; the level of 1 ppm in human subjects did not produce significant changes. Levels of 5 ppm produced an increase of about 40 percent, and at 13 ppm an increase of about 72 percent was seen.

4446 APTIC NUMBER 12986

Yamaguchi, S. and M. Esaki
THE EFFECTS OF AIR POLLUTION ON THE HEALTH OF RESIDENTS, THE VALUATION OF AIR POLLUTION BY THE CORNELL MEDICAL INDEX (CMI). (Taiki osen no seitai ni oyobosu eikyo: CMI ni yoru hyoka). Text in Japanese. Kuki Seijo (Clean Air-J. Japan Air Cleaning Assoc., Tokyo), 6(7):22-28, 1969. 20 refs.

The effects of air pollution on human health were studied by means of the Cornell Medical Index. The Index was administered to 3,430 subjects in Omuta, Japan in August, 1965 and in August, 1966. In 1965, the interviewers were instructed to visit homes,

explain to the subjects how to complete the questions of the Index, and ask them to return it. In 1966, the interviewers were trained to rate the Index directly from the subjects and assigned to a subject on one-to-one basis, spending 30 to 40 minutes for each case. The first administration failed to obtain adequate data. The second administration effectively collected data regarding the effects of air pollution on human health in the area. The most common complaints found among the subjects, in decreasing order, are sore eyes, frequent coughs, mucous in the throat, frequent sneezing, stuffed nose, and swollen glands. The results also indicate that the heavier the concentration of air pollution, the more neurotic patients and emotionally agitated people, were found.

4447 APTIC NUMBER 12272

Yuldashev, T.
TOXICITY OF ETHYLENE OXIDE IN LOW CONCENTRATIONS. In: The Biological Effects and Hygienic Importance of Atmospheric Pollutants, Book 10. Translated from Russian by B. S. Levine, U.S.S.R. Literature on Air Pollution and Related Occupational Diseases, Vol. 17, pp. 33-39, 1968.
CFSTI: PB 180522I

In exposure tests ethylene oxide (EO) as a poison affected all body organs and systems, principally the central nervous system. The EO odor perception threshold for most sensitive test persons was found to be 1.5 mg/cu m; threshold eye sensitivity to light 1.0 mg/cu m; and threshold of electrical cerebral activity 0.65 mg/cu m. It is recommended that 0.3 mg/cu m of EO adopted as the limit of its maximum concentration in atmospheric air. Chronic, 24-hr. exposure of white rats to the inhalation of air containing 0.3 mg/cu m of EO for 83 days produced changes, affected the animals' flexor-extensor chronaxy ratio and the chloride and residual nitrogen blood contents. It is suggested that the average daily maximal allowable EO concentration in atmospheric air be set at 0.03 mg/cu m. (Author's conclusion, modified)**

4448 APTIC NUMBER 13174

POLLUTION DWARFS WHITE PINES. Agri. Res., 18(2):4, Aug. 1969.

Air pollution is currently causing chlorotic dwarf disease in the eastern white pine (Pinus strobus L.), an important lumber source. Dwarfed pines have a sickly, mottled yellow color, are much smaller than normal pines, and eventually die from the disease. Investigations have established the contaminant as either sulfur dioxide, ozone, or an interacting mixture of both gases. Dwarf-susceptible pines developed intense disease symptoms when exposed to mixtures of ozone and SO2, each at a concentration of 6 to 10 ppbm. Serious symptoms also developed in susceptible pines exposed to 6 ppbm SO2. An Ohio survey reports over 30% of the pines in plantations and in young natural stands have the disease, and some pines were found to be genetically resistant to chlorotic dwarf.

4449 APTIC NUMBER 13213

Allcroft, Ruth and K. M. Burns
ALLEVIATION OF INDUSTRIAL FLUOROSIS IN A HERD. Fluoride Quarterly, J. Intern. Soc. Fluoride Res., 2(1):55-59, Jan. 1969. 2 refs.

To determine the alleviating effect of aluminum and calcium in fluorosis, a herd of 24 Ayrshire cows was exposed to airborne fluoride and divided into three groups. One group was given supplements of aluminum sulfate, another aluminum sulfate plus calcium carbonate and anhydrous sodium phosphate. The third group was used as control. Urinary fluorine excretion, skeletal fluoride accumulation, and the general health of the animals were evaluated. Aluminum sulfate reduced bone fluoride storage by 22% in comparison with controls. The calcium phosphorous supplement did not enhance the effect of aluminum sulfate alone. However, it appeared that fluoride accumulation was merely delayed and storage to undesirable levels could not be prevented by the aluminum sulfate treatment. (Author summary modified)

4450 APTIC NUMBER 12944

Applegate, Howard G. and Lane C. Durrant
SYNERGISTIC ACTION OF OZONE-SULFUR DIOXIDE ON PEANUTS. Environ. Sci. Technol., 3(8):759-760, Aug. 1969. 8 refs.

Peanut plants were fumigated with ozone and sulfur dioxide singly and together. When applied separately, both gases induced characteristic damage to the plants. Ozone-induced injury first occurred on high-moisture plants 24 to 48 hrs after the start of fumigation. The most mature leaflets turned chlorotic, starting at the middle and progressing toward the margin. Ultimately, while chlorotic but not necrotic, the leaflets abscissed. Sulfur dioxide-induced injury occurred on high-moisture plants 4 to 8 hrs after the start of fumigation. The youngest leaftlets first turned a light tan, and later a darker brown, along the margins. If fumigation continued, the necrosis progressed along the veins into the middle of the leaflet. The entire leaf abscissed when necrosis was complete. A synergistic action not characteristic of individual gases was found when the two gases were administered simultaneously. Four to five hrs after fumigation, a chlorosis similar in color to ozone injury alone appeared on the youngest leaflets of high-moisture plants. In contrast to the ozone-induced injury, the chlorosis started at the margin and progressed slowly to the midvein. After 46 to 50 hrs, the marginal chlorotic areas turned a light tan similar in color to the sulfur dioxide-induced injury. The necrosis progressed slowly inward and ultimately the leaf abscissed.

4451 APTIC NUMBER 12519

M. Askanazy
OSTEOMALACIA IN CATTLE AFFLICTED ALSO WITH SARCOSPORIDIA. ((Uber Osteomalacie der Rinder nebst Befunder von Sarkosporidien bei diesen Tieren.)) Text in German. Beitrage zur pathologischen Anatomie und Pathologie, 84:375-392, 1930.

Very often a diseased animal is diagnosed as afflicted by osteomalacia and in fact very little is known about it in veterinary medicine. No anatomic examinations of cattle have so far been conducted in this respect and yet it is very important to know the nature of the disease characterized by the symptoms of multiple bone rupture, stiffness of the muscles, difficulty of movement and loss of weight. Four animals displaying these symptoms were therefore slaughtered and examined. The results are reported in detail. The cows were indeed afflicted by osteomalacia. But in all these animals sarcosporidia were also found in the heart muscle. Any connection between the two diseases must, however, be ruled out. The latter is found rather frequently whereas osteomalacia is a relatively rare disease. No remarkable deformations of the skeleton were found in the four animals examined despite the fact that all had osteoporosis. Sclerosis of the aorta wall and ventricles, the milk glands and the kidney pyramids was found. The thyroid gland was not enlarged. No special pathological change in the marrow was found as has often been assumed. As causes for osteomalacia, a lack of CaO and P2O5 may be named. The straw fed to these animals was not exposed enough to sun radiation. It can be avoided by adding Ca and P and cod liver oil to the fodder. The possibility that SO2 or fluorine in the flue gas of industrial plants has any connection with the disease is mentioned in one sentence but no discussion of this problem is given.##

4452 APTIC NUMBER 12529

Bardelli, P. and C. Menzani
STUDIES OF SPONTANEOUS FLUOROSIS IN RUMINANTS: A NOTE ON PROPHYLAXIS. ((Ricerche sulla fluorosi spontanea die ruminanti: Nota preventiva.)) Text in Italian. Annali d'igiene, 45(6):399-404, 1935.

The opening of an aluminum refinery near a silkworm breeding region resulted in the destruction of silkworms on an increasing scale as the plant increased its operations. Investigations

showed that the cause of death among the silkworms was the ingestion, along with the mulberry leaves, of fluorine discharged into the air by the plant. In the same region, but somewhat later, the following effects were noted in cattle: malnutrition, lower milk yield, and persistent lameness. Still later, goats in the region developed the same symptoms. From an examination of the relevant literature, the authors concluded that the above-described symptoms were instances of fluorosis or fluorine cachexia, of the type reported among animals living near superphosphate or aluminum plants. In a controlled experiment the authors found that three cows and two goats who received 0.38 to 1.8 g fluorine per day developed clinical fluoroses identical to the spontaneous form, whereas the controls did not.##

4453 APTIC NUMBER 12559

Blaser, Ernst
CONTRIBUTION TO THE KNOWLEDGE OF HYDROGEN SULFIDE POISONING IN ANIMALS THROUGH LIQUID MANURE GAS. (PART I.) ((Ein Beitrag zur Kenntnis der Schwefelwasserstoffvergiftung beim Tier durch Jauchegase.)) Text in German. Schweiz Arch Tierheilk, 88:401-413, 1946.

An incident of liquid manure gas poisoning of two horses caused a closer investigation since very little is known about this type of poisoning in veterinary medicine. The various factors which led to the poisoning as well as the pathological-anatomic and histologic changes are described. A brief review on what is known and of some publications is given. The stable is a solid stone building with 3 compartments. On its west side is the only door as well as one window. The south side also has one window. A manure drain leads directly to the tank outside which is closed with a concrete lid. An opening of about 1 sq. m. in the lid is covered with wooden planks. At the time of the accident the atmospheric temperature as well as the stable temperature was rather low. The stirring mechanism in the manure tank was in operation. In cold weather the air has the tendency to penetrate into the manure tank through the opening. Above the stirring mechanism the air warmed up somewhat and rose through the manure drain directly into the stable. An autopsy of the dead animals showed that no blood coagulation occurred, a light imbibition was found and bleeding of the throat. Moreover lung edema and changes in the liver and kidney parenchyma were diagnosed. In the microscope, extensive damage of the liver, no H2S was found. The results of the autopsy as well as the prevailing conditions in the stable led to the assumption that liquid manure gases (H2S, possibly accompanied by CO2 and NH3) were the cause for the sudden death of the animals.##

4454 APTIC NUMBER 12551

Cristiani, H.
CHANGES IN THE THYROID GLAND UNDER FLUORIC POISONING. ((Alterations de la glande thyroide dans l'intoxication fluoree.)) Text in French. Compt. Rend. Soc. Biol. (Paris), 103:554-557, 1930.

Thyroid gland changes are studied in animals subjected to chronic poisoning by ingestion of small doses of alkaline fluorides or fluorsilicates. Because goiters are frequent in this area of the country, control animals were included in the experimental groups. Test results on 14 fluorinated animals (guinea-pigs) are tabulated. Death occurred in 19 to 94 days (average 53). All animals showed changes in the gland, the interstitial tissue. The changes here were rapid, but may be slower with smaller doses. All control animals were found to be healthy. Macroscopic changes in the pituitary body in cases of fluorosis. The different endocrine glands react differently to fluoric poisoning. The pituitary gland is difficult to study because this gland varies with age, sex, pregnancy, etc. of the subject. Use was therefore made of adult guinea-pigs 6 to 8 months old, which had died of fluoroxix. Their pituitary body was compared to that of control animals of the same age and sex. Results are tabulated, showing a shrinking of the gland in the test animals, mostly in the nature of a flattening 2.25 mm (normal average) to an average of 1.7 mm (after poisoning).##

4455 APTIC NUMBER 12553

Cristiani, H. and R. Gautier
EXPERIMENTAL RESEARCH ON THE TOXICITY OF FODDER HARVESTED IN THE VICINITY OF AN ALUMINUM-PRODUCING FACTORY. ((Recherches experimentales sur la toxicite des fourrages recoltes dans le voisinage d'une usine productrice d'aluminium.)) Text in French. Ann. Hygiene Publ., Ind. Sociale, 4:141-154, 1926. 7 refs.

Experiments were made from 1919 to 1924 on guinea-pigs whose diet contained, in part, fodder exposed to the emanations of an aluminum factory. The animals died after a time that depended on the amount of fluorine present in the fodder. Death was preceded by cachexy and symptoms similar to those exhibited by cattle in areas around the same factories. Test results are tabulated. The fodder must contain more fluorine than normally present in such plants. These conditions were obtained around the subject factory, during intense production only. A second set of tests were made on fodders artificially altered by gases containing fluorine. The results were similar to those described above and showed that other gases than fluorine, which may additionally have altered the fodder, are not necessary for the production of the disease.##

4456 APTIC NUMBER 12552

Cristiani, H. and R. Gautier
FLUORIDE EMANATIONS FROM FACTORIES: EXPERIMENTAL STUDY OF THE ACTION OF FLUORINE PLANTS. ((Emanations fluorees des usines: etudes experimentale de l'action du fluor sur les vegetaux.)) Text in French. Ann. Hygiene Publ (n.s.), 3:49-64, 1925. 17 refs.

Research work from 1883 onward and the authors' own experiments on the damages done to plants by fluoric emanations from aluminum and/or chemical fertilizer factories are reviewed. Fluoric

compounds may act through the soil and water that feed the plants, or directly on the plant organs exposed to fluorine-polluted air. Of the various toxic gases, hydrofluoric acid is the most noxious since it forms thick fogs with the humidity in the air. The effects are cumulative and may not become visible before repeated exposure of the plants to the gases. The toxic action of HaF derives from its ability to precipitate lime and to attach itself to other substances, such as proteides. Also, fluorine salts have antiseptic action on unicellular elements, and this has had practical applications. At the doses utilized, alkaline salts of fluorine do not precipitate albumin, and can hamper microbial growth without harming soluble ferments. On the other hand, examination of plant lesions enables the detection of their fluoric, as opposed to other (sulfur, chlorine....) origin. Stoklasa claims that the amount of emanation and smoke has increased 100-fold in the last century, reducing the crops in some regions by 30 to 90%. The work on fodder from industrial areas was confirmed by experiments with fluorine compounds in air and in water.##

4457 APTIC NUMBER 13804

De Cormis, L. and G. Viel
STUDIES CONCERNING THE EFFECTS OF POLLUTINGS ON CROPS. (Etudes concernant les effets des pollutants sur les cultures). Text in French. Rev. Hyg. Med. Soc., 17(3):307-312, 1969.

Damage to crops and vineyards in certain areas of the Basses-Pyrenes was attributed to pollutants emitted by the industrial complex at Lacq, particularly to the sulfurous gas discharged by a desulfurization plant. Air measurements revealed the presence of SO2 in the neighborhood of the factories and strong intermittent pollution at distant points. However, necrosis was observed on plants relatively resistant to SO2-induced injuries and plant damage in the area of the factories is attributed to atmospheric fluoride components. In other areas, fluoride levels were not high enough to explain the necrosis. Laboratory studies indicate that fluoride and sulfur are normal components of plant tissues, so their presence is not a factor in determining pollution. Plants, especially apricot trees, are indicators of fluoride pollution. The acidity of rainwater cannot be assumed to have a direct relationship to plant damage. In controlled atmospheres, plants were enriched by subtoxic quantities of sulfur and fluorine. However, sulfur is metabolized by plants while fluoride is accumulated and can attain toxic levels.

4458 APTIC NUMBER 12554

Ehrlich, C.
OBSERVATIONS AND INVESTIGATIONS OF CHRONIC FLUORINE POISONING IN CATTLE. ((Beobachtungen und Untersuchungen uber chron. Fluorvergiftungen bei Rindern.)) Text in German. Deut Tieraerztl. Wochschr., 61:225-228, June 1954.

Fluorine poisoning of cattle grazing in the vicinity of an aluminum plant was observed which lead to extensive clinical, pathologic-anatomical, bacteriological, serological and parasitological examinations. The clinical symptoms shown by the diseased animals were loss of weight, retardation in the development of young cattle, lusterless skin, stiff and pain-stricken movement, swollen ankles, impaired fertility of female animals, brown and black colored teeth which became loose and exostoses at the jaw bones and ribs. Sometimes a difficulty in breathing developed with the pulse becoming weak and irregular. A closer investigation of the deformed ribs showed that at the sites of the exostoses, the bones could be cut through very easily. No parasitic or bacteriologic ailment was found in the animals. The chemical analysis yielded a high fluorine content in the teeth and bones which was on the average one to ten times as high as with healthy animals. The increase of the normal fluorine contents was lowest in the blood and highest in teeth, bones, claws and in the urine. To answer the question of how these toxic fluorine compounds entered the body, samples of the grass and soil in the vicinity of the aluminum plant (up to a diameter of 2 km) were examined. The fluorine contents of these samples was 31 to 56 times higher than of samples taken outside the range of the plant. Thus the animals consumed the fluorine with the fodder which was intoxicated either by fly dust and/or by nourishing on a soil rich in fluorine.##

4459 APTIC NUMBER 13159

Ferrando, R. and G. Milhaud
THE BIOLOGICAL EFFECTS OF AIR POLLUTION OF ANIMALS. (Effets biologiques de la pollution atmospherique sur les animaux). Text in French. Rev. Hyg. Med. Soc., 17(3):295-306, 1969. 2 refs.

Air pollution has many effects on animal organisms. Fluorine by-products, lead, and molybdenum are the major offending constituents in industrial air pollution. Cement dust and sulfur dioxide cause less of a problem. Pollution of agricultural origin is essentially linked to the more or less controlled use of pesticides. A temporary imbalance of natural fauna is most often indicated when domestic animals are victims of atmospheric pollution. The damage caused to livestock by this pollution will remain localized and its economic consequence will be relatively unimportant. The social consequences of this pollution are more severe, and it is as important to preserve the social climate as the health of the animals. The solution to these problems has long been in the hands of lawyers. Though indirect, the risk to the food cycle is serious. It will be necessary to institute strict tests for determining the amount of residual pollutants able to exist in food destined for men and to regulate the use of products absorbing these pollutants.

4460 APTIC NUMBER 12647

C. W. Francis, G. Chesters, W. H. Erhardt
210 POLONIUM ENTRY INTO PLANTS. Environ. Sci. Technol., 2(9):690-695, Sept. 1968.

The possibility that root uptake of 210Pb from soils is the principal mechanism of 210Po entry into plants was evaluated and proved to be invalid. If the 210Pb in the plant is not soil-derived, the second most likely source is natural radioactive fallout, of which the most important component is from rainfall. Material balances of the quantities of 210Pb in tobacco over time intervals of known rainfall indicate rains deposit approximately twice as much 210Pb as observed in tobacco leaves, verifying the hypothesis that deposition of 210Pb by rainfall is the principal mechanism of 210Po entry in plants. (Author's Abstract)##

4461 APTIC NUMBER 12556

Gerschmann, Rebeca
PARATHYROID AND FLUORIC HYPOCALCEMIA. ((Parathyroide et Hypocalcemie Fluorique.)) Text in French. Compt Rend Soc. Biol. (Paris), 104:411-412, 1930

The tests on dogs here described show that the parathyroids tend to maintain the calcemic level at its normal value, contributing to raise it when it otherwise may fall. Sodium fluoride served as hypocalcemic agent, injected intravenously (30 mg per kg animal weight). Calcium was measured in the blood serum, phosphates in the plasma, chlorides in the whole blood. In normal dogs, the calcium level ranged from 11 to 10.7 mg per 100 cc. After surgical removal of thyroid/parathyroid glands, the level dropped in 48 hours from 10.5 to 5.9 mg, with most of the animals falling into tetany. The injection in normal dogs produced hypocalcemia with a drop of 3.3 mg in 2 hours and then a gradual recovery to near-normal level after 24 hours; inorganic phosphates increased from 3.2 to 5 mg; chlorides showed no regular changes. The same injection in dogs deprived of the glands caused a greater drop in calcium, yet smaller than the sum of the drops caused separately by the fluoride and the parathyroidectomy. But the lowered calcium level does not recover: the recovery seems to be due mostly to the operation of the parathyroidic function.##

4462 APTIC NUMBER 12558

Henneman, Josef
FREQUENT OCCURRENCE OF STOMACH AND INTESTINAL DISEASES IN CATTLE CAUSED BY IRON CONTAINING FLUE GASES. ((Gehauft auftretende Magendarmerkrankungen bei Rindern infolge eisenhaltiger Ranchgase.)) Text in German. Wien. Tieraerztl. Monatsschr., 18(4):225-231, 1931. 10 refs.

Farmers near the magnesium factory in Veitsch, Styria, Austria, complained about stomach and intestinal troubles of their cattle accompanied by a lower milk production. While the disease spread up to 4 or 5 km along the valley in the direction of the wind, it did not occur beyond 500 to 800 m from the factory in the opposite direction of the wind. Moreover the disease worsened in dry weather and improved in rainy weather. The cattle recovered rapidly after the operation of the kiln was halted for some time. One farmer claimed that the quality of the milk also changed, while four other farmers could not confirm this observation. Veterinary examinations determined that in all cases heavy diarrhea occurred. The mucous tissue in the mouth was rather dry. Except for one case no fever was measured. The cow most seriously affected by the disease showed an enlargement of the liver. The respiratory organs of all examined cases showed no abnormality. Samples of the fodder and the excreta as well as of the mucous tissue of the stomach were sent to a chemical laboratory for examination. Substantial amounts of iron were found in all these samples. In the fodder it was found in the form of rust particles. An examination of the flue gas from the magnesium factory confirmed the assumption that it discharged the iron. The disease was found to afflict the digestive tract only, no respiratory diseases, tuberculosis, or osteomalacia was observed.##

4463 APTIC NUMBER 12533

Hupka, E. and Luy, F.
FREQUENT OCCURRENCE OF OSTEOMALACIA AMONG GRAZING CATTLE CAUSED BY HYDROFLUORIC ACID CONTAINED IN THE FLUE GAS DISCHARGED BY A CHEMICAL PLANT. ((Gehauftes Auftreten von Osteomalacie unter Weiderindern, verursacht durch Fluorwasserstoffsaure enthaltenden Fabrikrauch.)) Text in German. Arch wissenschaft-liche praktische Tierheilkunde (Berlin), 60:21-39, 1929. 12 refs.

In the year 1928 a number of animals grazing in the vicinity of a chemical plant fell ill to a disease which was diagnosed as fluorosis. But the symptoms shown by the diseased animals were in many respects different from those commonly associated with such cases. The two front legs became lame, toes and ankles were swollen. The pulse rate was higher, an increased body temperature was measured and pain was felt. In some cases the hind legs became stiff. Furthermore an enormous loss of weight was observed and swellings appeared along the ribs. The milk production decreased. All these symptoms indicate osteomalacia. The grass on which these animals fed was examined but it was found lush and in no way lacking in Ca and phosphoric acid (osteomalacia is a deficiency of these two minerals). The toxicant was found to be the fluorine deposited on the grass and plants. Hydrofluoric acid attacks the calcium in the bones and dissolves it which means that the calcium is constantly reduced. The consequence is osteoporosis. The fluorine is discharged with the flue gas of the nearby chemical plant. The disease did not occur outside the range of the chemical plant. The condition of the animals visibly improved during winter time when they were fed with fodder coming from an unpolluted area. The animals were treated with nephritine which relieved them of their pain. The chemical physiological examinations which were conducted showed that the calcium of the bones is used to neutralize the hydrofluoric acid. The by-product of this neutralizing process, phosphoric acid, is discharged with the urine.##

4464 APTIC NUMBER 12538

Iagovkin, A. P.
HYGIENIC CONDITIONS IN THE OPEN-HOUSING SYSTEM OF CATTLE RAISING.

((Gigienicheskie usloviya stoilovo-lagernogo soderzhaniyz korov.)) Text in Russian. Nauchno-proizvcdstvennaya informatsiya, 7:109-111, 1954.

Open-housing raising of cattle was investigated at 7 farms. Effects of environmental conditions (temperature, moisture content and purity of air) on the physiological state and productivity of cattle raised under various conditions (tents, camp sheds, winter barnyards) were studied. Evaluations were made in terms of physiolcgical indices: pulse frequency, breathing, heat release and day and night milk yield. An investigation was made of pulmonary gas exchange with the aid of respiratory masks. The corresponding data, relating temperature, number of respiration and heat release, are tabulated and an optimum 24-hour time schedule is proposed, based on 8-hcur periods between milking and presumed night pasturing. The average annual milk yield of cattle under examination amounted to 4,000 to 5,000 liters under 40 to 50 per cent open-housing conditions. Summer camps necessitate the erection of adequate enclosures, because on cold or rainy days, or at night, the keeping of cattle in the open air decreases their milk yield. Winter barnyards may be also used, if necessary, on hot or cold days to provide cattle with rest. The barnyards then have to be constantly ventilated to prevent a detrimental rise in temperature, and moisture and ammonia content of air.##

4465 APTIC NUMBER 13787

Kettlewell, H. B. D.
DARWIN'S MISSING EVIDENCE. Sci. Am., vol. 200:48-53, 1959.

A profound change of color has occurred among hundreds of species of moths in industrial areas around the world. Moths which have been predominantly light in color are now turning dark or black through mutation. This phenomenon has occurred chiefly in areas suffering from high levels of industrial fallout. Observations have shown that the trees on which the moths rest have been darkened from air pollution and the dark moths are less conspicuous in this background. A dark to light ratio of 9:1 can be found in nearly all British industrial areas. Experiments have shown that the dark moths survive long in polluted forests than the light ones. It is concluded from the investigation that moths would be eliminated by predators unless they mutate to a form that is better suited to their new environment. Also, once the mutation has occurred, natural selection alone can be responsible for its rapid spread. It was also found that in some species of moths, the caterpillars of the dark form are hardier than those of the light form. There is evidence that, in a population of peppered moths that inhabits an industrial area, caterpillars of the light form attain full growth earlier than those of the dark form. This could be attributable to the increased precipitation of pollutants in late autumn. It is suggested that the light form will not be completely eliminated, but will attain a balance at about 5% of the total population.

4466 APTIC NUMBER 13798

Kettlewell, H. B. D.
NATURAL HISTORY AND AIR POLLUTION. New Scientist, no. 385:38, April 2, 1964.

The frequency of melanic moths depends on the presence of lichen, while the presence or absence of lichen, though affected by humidity and tree species, depends largely on the degree of air pollution. The correlation that exists between the disappearance of lichen from the coniferous and deciduous trees of eastern England and the gradual decline in melanism from central England to the east is evidence that foliage can be polluted by sulfur dioxide at considerable distances from its sources.

4467 APTIC NUMBER 13203

Lezovic, Jan
THE INFLUENCE OF FLUORINE COMPOUNDS ON THE BIOLCGICAL LIFE NEAR AN ALUMINUM FACTORY. Fluoride Quarterly, J. Intern. Soc. Fluoride Res., 2(1):25-27, Jan. 1969.

Quantitative and qualitative analyses of tissues, milk, and teeth, along with fluoride level determination of bones, show that animal and vegetable life near an aluminum factory is adversely affected by fluoride emissions. The factory is located in a mountain valley, within 300 meters of the nearest village. All trees examined showed a marked increase in the fluoride levels of their leaves or needles. The leaves of exposed fruit trees were harder, glossier, more fragile than normal, and covered with a whitish-gray crust. Similar changes occurred on leaves of garden vegetables, especially cabbage, turnips, and cucumbers. Fruit on trees was visibly deformed. The first signs of damage to animal life occurred two years after the factory went into operation, when about 95% of the goats and cattle were afflicted with fluorosis. Swine, horses, and poultry were less sensitive. The weight of the affected cattle gradually decreased to the point of cachexia. Calcium and phosphorous levels in the blood of the diseased animals averaged, respectively, 7.6 and 5.06 mg%. As an indicator of damage, fluoride deposits on snow were of the order of magnitude of 15 to 234.8 mg/sq m.

4468 APTIC NUMBER 12536

Liegeois, P., Derivaux, J., and Depelchin, A.
LEAD POISONING IN ANIMALS. ((L'intoxication saturnine chez les animaux.)) Text in French. Ann. Med. Veterinaire, 105:57-81, 1961. 22 refs.

Lead poisoning of animals occurs on many occasions, since lead and its compounds are found in the fields where they feed and in the water they drink. Toxic doses depend on the product (nitrate, chloride, acetate, minium, white lead, sulfate, sulfide, phosphate, in decreasing order) and sensitivity (horses are ten times more resistant than cattle, sheep, pigs, and dogs; poultry

is very sensitive). Absorption depends on the mode of intake. Rapid through the breathing appratus (which feeds the lead or lead compound vapors and dusts directly into the blood), it is slower through the digestive tract. Skin absorption is low. Localization: in cases of acute poisoning, lead is found in the digestive tract, vomited matter, the liver, spleen, kidneys. In chronic cases, lead appears in the bones, marrow, kidneys, blood, cephalo-rachidian liquid, milk, saliva, urine, stools. Elimination occurs through the milk, saliva, sweat, urine, and stools. Lesions include discoloration of the liver, kidneys, and muscles; infiltrations in the brain and rachis; neuritis and presence of basophiles. The action of lead on the cell is not fully known. Symptoms in acute cases include cramps, convulsions sometimes leading to death (in cattle); depression, paresis (in horses); anorexia, vomiting convulsions (in dogs); muscular weakness, thirst and death (in poultry). Chronic cases, mostly in dogs and cats, cause low temperature, loss of weight, constipation, rheumatism, cerebral and circulatory disorders. Diagnosis is based on nervous disorders and laboratory tests on body liquids, tissues, and stools (data is tabulated and described). Preventive treatment consists in keeping the animals away from lead polluted environment. Curative treatment seeks to turn the lead into nontoxic forms, to neutralize the toxic action of absorbed products, and to eliminate these products from the body. Antidotes include albuminous water, milk, saline laxatives, ferric hydrate. Most effective are chelating agents (CaEDTA). Intramuscular or veinous injections often cause spectacular results.##

4469 APTIC NUMBER 12537

Masek, J. and Hais, K.
NEGATIVE EFFECTS OF INDUSTRIAL EXHALATIONS ON CATTLE.
((Negativni ucinky prumyslovych exhalaci na skot.)) Text in Czech. Veterinarni Medicina, 8(5):341-346, 1963. 28 refs.

The present state of art is revieved and results are reported of long-term systematic investigations of the effects of industrial exhalations on the health condition and productivity of cattle in the region of Ostrava. The experisental locality suffers from heavy dust fall and is attacked by gas emissions containing mostly sulfur dioxide. As much as 33.90 per cent of ashes were assessed in hay prior to storing in one of the experimental areas. The investigation covered general health condition of livestock, weight increase (in 436 animals), milking and milk fat (in 300 animals). In 42 animals, a complex of biochemical and hematological indices was evaluated. The results, referring to a ten-year period terminated in 1962, are tabulated and plotted in graphs. The feeding of cattle with dusted forage caused frequent incidence of diarrhea and pneumoconiosis simplex. In comparison with the national standard, a decrease was assessed in milking of 9.1 per cent per day per animal, in milk fat of 8 per cent, and in weight of 26.4 to 37.5 percent. Also, frequent abortions were evidenced. The annual overall loss is estimated at 160 to 180 million Kcs.##

4470 APTIC NUMBER 13247

Mohamed, Aly M.
CYTOGENETYC EFFECTS OF HYDROGEN FLUORIDE ON PLANTS. Fluoride Quarterly, J. Intern. Soc. Fluoride Res., 2(2):76-84, April 1969. 8 refs.

Studies on the effects of hydrogen fluoride on meiotic chromosomes of tomatoes indicated a trend toward a higher frequency of chromosomal aberrations with an increase in the fumigation period. Hydrogen fluoride was shown to induce paracentric inversions with the possibility of deficiencies, duplications, or even translocations. The progeny of the treated plants, produced a number of abnormal phenotypes the same as, or similar to, known mutants. Further studies in maize microsporocytes for plants treated with HF confirm the cytological data reported for tomato plants. They offer clear evidence of inversions, translocations, and deficiencies. The results suggest that HF affects DNA synthesis by blocking, directly or indirectly, the replication of the DNA molecule. (Author summary modified)

4471 APTIC NUMBER 12538

Marozny, J.
DENTAL FLUOPISIS OF CATTLE. ((Dentalna fluorcza hovadzieho dobytka.)) Text in Slovak. Veterinarni Medicina 7:421-428, 1965.

The syndrome of dental fluorosis was used for evaluation of the toxic effect of fluorine exhalates from a Slovak aluminum-producing factory, and of the territorial area thus contaminated. During 1964, 5,320 animals from 31 localities of the examined region were investigated. The findings were evaluated in accordance with Dean's 5-grade classification system which proved fully relevant ot the experimental conditions selected. The emissions were found to be air-flown mainly in two directions and they affected the territory up to 16 km from the source of emission. The examined area was divided into five classification zones and the occurrence of dental fluorisis was evaluated and tabulated for each of them. The results indicate that unusual wear and abrasion of teeth, due to acute dental fluorisis, unfavorably affect the life span of cattle regardless of the fact that cattle can develop a certain adaptability to the fluorine compounds.##

4472 APTIC NUMBER 12539

Ogura, Y.
MOLYBDENUM POISONING IN CATTLE DUE TO AIR AND SOIL CONTAMINATION AS AN INDUSTRIAL HAZARD. Text in Japanese Tokyo National Institute Animal Health Bulletin, 50:24-29, 1965. 27 refs.

In one of the pastures of Hyogo Prefecture, Japan, fifty-two cattle developed diarrhea and malnutrition, and decreases in milk production and in the rate of conception were found. The

diagnosis of molybdenum poisoning was made based on the above symptoms and the results of a quantitative analysis of the animals' blood, the soil and fodder of the pasture for molybdenum and copper content. Molybdenum in the fodder obtained from that area was higher than normal. The highest was 484.0 ppm. which was more than 100 times the normal. Copper content in the same specimens, on the other hand, showed normal levels. Molybdenum content in the blood of these cattle was at least 10 times higher than normal. With the administration of copper ($CuSO_4$), the amount of molybdenum in the blood decreased and symptoms subsided. Molybdenum content in the milk at this stage was within normal limit. The main cause of this poisoning was found to be the contamination of the soil by molybdenum dust which was scattered from the chimney of the nienghboring molybdenum-smelting factory. Plants and soils at several distances from the factory were collected and analyzed. The closer to the factory, the higher the molybdenum content. Even at 1 km distance, the value was still higher than normal. Experiments on rats by administering molybdenum showed no evidence of interference with the conception ability. However, further investigations would be required to make a definite conclusion as to whether molybdenum poisoning interferes with the cattle's reproductive abilities or not.##

4473 APTIC NUMBER 12540

Pavlovic, R. A. and Bogdanovic, S. P.
CALCIUM AND PHOSPHORUS IN RABBIT BLOOD SERUM FOLLOWING SODIUM FLUORIDE POISONING. ((Le calcium et le phosphore du serum sanguin chez le lapin apres l'intoxication par le fluorure de sodium.)) Text in French. Compt Rend., Soc. Biol (Belgrade). 109:475-477, 1932. 3 refs.

The process involved in sodium fluroide poisoning is of interest in both the toxicology and the general pathology of bone and articulation sicknesses. We know little about the part played by fluorine in rachitis. Certain substances important in bone pathology have been determined in the blood, but the results obtained have not been interpreted. The initial weight of the rabbits used ranged between 1350 and 2200 gr. Calcium and phosphorus were determined in the blood serum before and after poisoning by injections of a 1% solution of sodium flucride. Chronic poisoning was produced by daily injections increasing from 10 to 30 mgr of solution per animal kg over a period of 105 to 121 days. This caused calcium to diminish from 17.6 to 14.5 mgr per 100, and phosphorus to fall from 7.4 to 6.3 mgr per 100, against 18.1 to 17 and 9.6 to 8.3, respectively, in control animals. Acute poisoning was produced by a single injection of 60 mgr per animal kg. This caused the calcium to diminish from 16.6 to 14.7 mgr per 100, and phosphorus to fall from 7.3 to 5.5 mgr. No change was found in the control animals.##

4474 APTIC NUMBER 12544

Rubay, M.
ABOUT THE FOG OBSERVED IN THE MEUSE VALLEY IN DECEMBER 1930 AND ITS NOXIOUS EFFECTS ON ANIMALS. ((A propos du brouillard observe dans la vallee de la Meuse en Decembre 1930 et de ses effets nocifs chez les animaux.)) Text in French. Ann Med Veterinaire, 77:145-158, April 1932.

The facts reported in the previous article are interpreted in this second article. All animals examined were convalescing from fog sickness and still showing some subcutaneous emphysema consecutive to lung emphysema. The symptoms of the sickness point to an increase of carbon dioxide and decrease of oxygen in the blood; and the dyspnea, cyanosis, and asphyxia exclude the hypothesis of poisoning by a product entering the body through the lung membranes. Other possible factors would indicate that: the fog alone could not by itself cause the accidents observed among the cattle; the smoke and emanations from the factories are the determining element; the fog becomes noxious under the combined effect of its intensity, duration, absence of wind, low temperature, and the resulting stagnation of the fog and factory pollutants within the restricted space of the area. More so than other animals, cattle appear susceptible to fog sickness. Direct determination of the noxious agent was impossible, since no spectroscopic or toxicological tests could be made on either blood or viscera samples. But others seem mostly to incriminate the irritating action of sulfuric substances (rather than poisoning) dissolving in the water droplets of the fog. Lack of precise determination of the noxious agent prompted the courts to dismiss the case against the factories; but the investigating Government Commission recommended strict application of existing factory regulations and that new measures be provided to restrict industrial emanations into the air.##

4475 APTIC NUMBER 13942

Skye, Erik
LICHENS AND AIR POLLUTION. A STUDY OF CRYPTOGAMIC EPIPHYTES AND ENVIRONMENT IN THE STOCKHOLM REGION. Acta Phytogeograph. Suecica, 52, 138p., 1968. 221 refs.

The distribution and composition of the epiphytic lichen flora in the Greater Stockholm region are investigated, and the environmental conditions which may influence these distribution patterns are analyzed. The literature and various theories that are part of the ongoing controversy about the effect of the urban environment on lichen flora are extensively reviewed. Field work was carried out only with the corticolous species, and on those in particular which appear on the lower parts of the trunks up to a height of 2.5 m in order to obtain relatively homogeneous and comparable environmental conditions; 659 trees were analyzed. The region covered by the field investigations is described with reference to its physical features, urbanization pattern, and previous botanical studies. Data are presented on the composition and distribution of the epiphyte flora, and a detailed analysis was made of the importance of various atmospheric, biological, and substrate factors for the distribution pattern. Morphological and physiological changes in epiphytes affected by sulfur dioxide are discussed. Evidence generally seems to suggest that lichens have a greater sensitivity to the adverse affects of air pollution than other plants.

4476 APTIC NUMBER 12545

Studer, R.
AN INCIDENT OF ACUTE LIQUID MANURE GAS POISONING OF A HORSE. ((Ein Fall akuter Jauchegasvergiftung eines Pferdes.)) Text in German. Schweiz. Arch. Tierheilk., 90:157-159, 1948.

On November 7, 1947 a horse was found dead in its stable by his owner. The veterinary doctor, called immediately to the scene, soon found out that the reason for the horse's death was an acute poisoning from the gas of liquid manure. About 20 minutes after the preparations for the piping of the liquid manure onto the fields began, an employee found the horse already dead. He opened the door thereby probably saving his own life and that of the other horses in the stable of which two already showed signs of poisoning. The doctor arrived 45 minutes later. Meanwhile the other two horses had recovered. A plan illustrates the location of the stable in relation to the manure tank. The stable had the dimensions of 6/5/2m. The two small windows were closed on this day because it was very chilly. The manure drainage opening (20/50 cm) was left uncovered on this day. The concrete manure tank outside the stable was almost full leaving only 40 cm free to the top. The accident was caused by two coinciding factors: a strong wind from the north and the location of the stable directly south of the manure tank. The wind prevented the escaping of the deadly gas through the only opening in the tank and it produced a turbulent current in a southward direction instead which carried the gas through the drain pipe directly into the stable. The horse closest to the manure drainage opening was naturally the first victim.##

4477 APTIC NUMBER 12166

Frances A. Wood, John B. Coppolino, Donald Davis, David Drummond, and Ray Wilhour
AIR POLLUTION EFFECTS (INTERIM PROGRESS REPORT.) Pennsylvania State Univ., University Park, Center for Air Environment Studies, ((95))p., Jan. 1969. 8 refs.

An exposure system has been constructed out-of-doors which will permit the exposure of several hundred plants simultaneously to low levels of ozone or peroxyacetylnitrate (PAN) for extended periods of time, and a series of plant growth chambers for use in studies of pre- and post-fumigation environmental influences on plant response have been purchased and checked out. Approximately 9,000 seedlings of 34 different tree species have been acquired for exposure purposes and procedures have been developed for handling and maintenance of the plants. Approximately 4,000 seedlings of the 34 species have been exposed to 25 pphm ozone for 8 hours; 16 species were found sensitive. Nine of the species were conifers, seven were hardwoods, and Virginia pine, jack pine, Austrian pine, white ash, green ash, and white oak were among the most sensitive. Symptoms that developed on the 16 species were described in detail. Most of the 16 species were resistant during the first month following bud-break. Plants were sensitive for periods of 6 to 14 weeks during the growing season and they maintained about the same level of sensitivity as age of the current tissue increased. Virginia pine and white ash were selected for intensive studies of the influence of pre-, during, and post-fumigation environmental regimes on plant response to ozone. Preliminary studies indicate that high temperatures and/or high relative humiditie during the pre- and/or post-fumigation periods enhance the development of symptoms on both species.##

4478 APTIC NUMBER 13180

Barton, K. and Z. Bartonova
EVALUATION OF THREE YEARS OF ATMOSPHERIC CORROSION EXPERIMENTS WITH IRON, COPPER AND ZINC ON CZECHOSLOVAK EXPOSURE SITES). (Auswertung dreijahriger atmospharischer Korrosionsversuche mit Eisen, Kupfer und Zink auf Tschechoslowakischen Prufstationen). Text in German. Werkstoffe Korrosion, 20(2):87-93, Feb. 1969. 18 refs.

To get some new insight into long-term atmospheric corrosion processes, experiments were performed with 100/150/1 to 1.5 mm iron, copper, and zinc plates. The evaluated results cover the period from October 1963 to September 1966. The metals were exposed a total of 1050 to 1063 days. As the corrosion vs time curves show, a stationary state is reached which can be defined by a constant corrosion speed. This holds for all three metals. As found earlier, the stationary state sets in sooner in aggressive (polluted) atmospheres than in clean ones. The linear - 'stationary' state of the corrosion process was used to pursue some greater details of the relationship between atmospheric corrosion conditions and the corrosion speed. For this purpose, the corrosions in g/sq m for the period 1/1/1965 to 5/31/1966 was computed partly by extrapolation. With these data, the mean corrosion speed during the intervals between an assumed presence of electrolytes was computed. The results of this computation showed that despite of the marked difference between the cumulative SO2 adsorption at the exposure sites Hurbanovo and Praha-Letnany, no difference in the speed of corrosion was found between copper and zinc; the acceleration of the corrosion of iron was not very pronounced. On the other hand, the relatively small increase in SO2 adsorption between Praha-Letnany and Usti accelerated the stationary corrosion process almost threefold. These results could be used for an interpretation of the influence of SO2 on the stationary corrosion process. In semilogarithmic coordinates the relationship was non-linear. The stoichiometric relationship between corrosion and SO2 adsorption was higher for iron than for copper and zinc.

4479 APTIC NUMBER 13808

Becker, Gerhard, Devender Dhingra, and Christian Thoma
MECHANISM OF THE FORMATION OF RUST ON STEEL RESISTING TO ATMOSPHERIC CORROSION. (Mechanismus der Rostbildung auf witterungsbestandigem Stahl). Text in German. Arch. Eisenhuettenw., 40(4):341-349, April 1969. 23 refs.

Weather-resistant steels containing varying amounts of C, P, Cr, Cu, and Ni were studied to determine the mechanism of the formation of corrosive deposits caused by atmospheric pollution. The various steels were exposed for 9, 12, 20, and 72 months to the atmosphere of a foundry. The resulting rust was either porous or solid and was mechanically removed in layers down to the metallic surface. The rust was treated with methyl bromoacetate for 30 min at 60 C to dissolve any remaining metal, and the spectral analysis was carried out according to the 'Tape' method of Heller and Slickers. The physical and chemical properties of the deposits were evaluated by chemical analysis, optical microscopy, electron microscopy, and X-ray diffraction. The proportions of the alloy elements Cr, Cu, and Ni to iron in the solid rust were nearly the same as in the steel. In the porous rust, there was a very slight reduction in Cu and Ni content and a considerable reduction in Cr content. After 12 months of exposure, Cr content of the porous rust was 0.37% and of the solid rust, 0.82%; this difference diminished with increased exposure time. The higher rust content of Si, CaO, MgO, and P was apparently due to deposition of fly ash. The especially high content of sulfur in the rust (about 50 times higher than in the steel) was attributed to the sulfur dioxide content of the air. The results are interpreted by describing the evolution of reactions with the formation of blocking layers.

4480 APTIC NUMBER 13868

Burgmann, Gerda and Wilhelm Schwenk
COMPARATIVE TESTS ON CORROSION RESISTANCE OF GALVANIZED AND ALUMINIZED STEEL SHEET. (Vergleichende Untersuchungen uber die Korrosionsbestandigkeit verzinkter und aluminierter Stahlbleche). Text in German. Arch. Eisenhuettenw., 39(8):623-628, Aug. 1968. 14 refs.

The corrosion resistance of zinc-sprayed and galvanized steel sheets was investigated and compared by salt water jet tests, storing in sodium chloride solutions, and testing in artificial industrial atmospheres with and without carbon dioxide or sulfur dioxide. Test surfaces were evaluated and their sections were examined for corrosion products by X-ray and chemical methods. Zinc coatings afforded significantly greater cathodic protection than aluminum for cuts and defects. Sprayed coatings were shown to be superior to those of galvanized surfaces.

4481 APTIC NUMBER 12992

Chaikivsky, Michael
NEAR STOICHIOMETRIC COMBUSTION OF HEAVY FUEL OIL. (Nahstochiometrische Verbrennung von schwerem Heizol). Text in German. Erdoel Kohle (Hamburg), 21(2):86-90, Feb. 1968. 10 refs.

Studies conducted by the Central Electricity Generating Board in Great Britain showed that corrosion of the air preheater and emission of acid soot flakes is avoided if combustion takes place in an environment of only 3 to 5% excess air. At 1% excess air, even caking of the superheater can be avoided. To study the mechanism which leads to reduction of caking of the superheater, as well as to determine the effects of combustion at low levels of excess air, the Esso Res. Dept. conducted laboratory tests on two scaled-down boilers equipped with two spray burners. First, the effect of less excess air on the SO3 content of the flue gas at low temperature was investigated. The results showed that near stoichiometric combustion of heavy oil reduces the SO3 content considerably, which in turn leads to a lower acid dew point. Between 10 and 2% of excess air, the SO3 content of the

flue gas was reduced from 40 to 22 ppm, and between 2 and 0.5% it dropped steeply to 4 ppm. Similarly, nitric oxide emission could be reduced from 323 ppm at 15% excess air to 119 ppm at 3% excess air (63%). As a result, there is less danger of low-temperature corrosion and the boiler capacity can be increased. A higher amount of solid substances formed in the stack, but they were less acid and had a lower tendency to agglomerate. To study the effects of near stoichiometric combustion on caking and corrosion at high temperatures (700 C at the tube walls), several 100-hour experiments were conducted. A clear reduction of caking and corrosion could be observed as the level of excess air was reduced from 15 to 1%. As a result, higher superheater temperatures can be used in future boilers. The critical point for excess air lies at 3%, below which there is remarkably less caking and corrosion. This can be explained by the formation of low vanadium oxides which have a high melting point. For instance, no vanadium pentoxide was found.

4482 APTIC NUMBER 13089

Elliott, J. F. E. and A. G. Franks
DESIGN OF TELEPHONE EXCHANGES FOR CORROSIVE ATMOSPHERES. Tin Its Uses, no. 81:8-12, 1969. 2 refs.

The design of telephone equipment for the Rotorua area in New Zealand has presented special corrosion problems because of the high H2S and SO2 content of the atmosphere caused by geothermal activity. Servicing costs of the original system rose excessively after three years of operation. Investigations showed an H2S concentration between the extremes of 0.1 and 5.5 ppm. Normally, concentrations run between 0.004 and 0.18 ppm. Laboratory experiments on construction materials other than Cu and with protective finishes showed that corrosion was only slightly retarded by using Cu alloys, but tin plating was unattacked after 60 days of exposure to 100 to 120 ppm H2S in air. Nickel plating showed relatively slight signs of pitting under the same conditions. It was concluded that tin plating 0.0002 in. thick provided good protection against H2S corrosion, while nickel plate 0.0003 in. thick was more porous and less satisfactory. Complete solution of the corrosion problem included incorporation of secondary air purification and dust proof enclosures. Components within the enclosures were generally nickel plated. External test points, battery jacks, metal connectors, lamp and operator jack springs, bus bars, and connectors were all tin plated. The racks for the main and intermediate distribution frames were not enclosed, and tin plating of all nickel-silver springs was incorporated. Tin plate or flow-brightened tin plate was generally used as an alternate finish to nickel or silver plate on Cu alloys.

4483 APTIC NUMBER 13369

Nukui, Saburo and Akihiro Yamamoto
STUDIES ON THE CORROSION OF METALLIC MATERIALS BY POLLUTED AIR. (Osen kuki ni yoru kinzoku zairyo no fushoku ni kansuru kenkyu). Text in Japanese. Netsu Kanri (Heat Engineering, Tokyo), 21(6):28-44, June 1969. 9 refs.

An outdoor test which exposed metallic materials to falling dust, SO2, and salt particles was performed on the roofs of buildings in 13 places in Japan selected at random. Twenty-nine kinds of metals, including iron, steel, stainless steel, aluminum, and zinc plating were used. Severity of corrosion depended upon the severity of air pollution, and the corrosion was related to the amount of SO2 in the ambient air and SO4(2-) and Cl(-) in the falling dust. Iron was the most corroded metal, followed by steel, SUS 22, aluminum, and SUS 27. Zinc plating and metallic paints showed little tendency to corrode (about 1/100 that of iron). Dirt stains in metallic paints were mostly due to corrosion of iron particles. Experimental corrosion of metallic materials was performed indoors using SO2 gas, and periodic exposure to clean water, ultravielet light (using an arc light), and heat to compare the results with those resulting from outdoor exposure. The results did not correlate well, since corrosion in the ambient air was confounded by other pollutant particles. Therefore, corrosion tests under experimental conditions should include pollutant particles found in the ambient air.

4484 APTIC NUMBER 13086

Jonakin, James, G. A. Rice, and J. T. Reese
FIRESIDE CORROSION OF SUPERHEATER AND REHEATER TUBING. Preprint, Am. Soc. Mech. Engrs., 8p., 1959. 4 refs. (Presented at the Fuels-AIME (Am. Inst. Mech. Engrs.) Conference, Cincinnati, Ohio, Oct. 26-29, 1959).

At a steam electric station, studies were made to determine the mechanism by which constituents of the coal ash adhere to tubing and how the deposits cause corrosion. The wastage of a particular type of stainless steel alloy was directly associated with ash constituents having low melting temperatures. The relation of metal wastage to metal temperature was found to be a bell-shaped curve with the maximum metal loss occurring at about 1050 to 1150 F. The wastage occurred only under deposits. Sulfurous gases from the flue gas combine with tube deposits to form complex alkali iron sulfates which are molten in the temperature range of maximum metal wastage. Stainless-steel shields were a good temporary measure for the protection of superheater and reheater tubes from deposit-type corrosion.

4485 APTIC NUMBER 13046

Kadoi, Norio
A STUDY OF THE SURFACE TARNISHING AND THE CORROSION PRODUCTS OF CU AND CU-ALLOY. (Do oyobi dogokin no hyomen henshoku no jirei to hyomen seiseibutsu ni tsuite). Text in Japanese. Kuki Seijo (Clean Air-J. Japan Air Cleaning Assoc., Tokyo), 6(2):70-76, June 1968. 3 refs.

The mechanisms of surface tarnishing of Cu and Cu-alloy are reviewed. The actual examples of the surface tarnishing and the x-ray analysis of the corrosion products of Cu and Cu-alloy collected from various locations in Tokyo show that there is

considerable correlation between the cause of the surface tarnishing and the corrosion products, and that environmental factors, such as weather, make a great difference to the corrosion products of Cu and Cu-alloy.

4486 APTIC NUMBER 13877

McLeod, W. and R. E. Rogers
CORROSION OF METALS BY AQUEOUS SOLUTIONS OF THE ATMOSPHERIC POLLUTANT SULFUROUS ACID. Electrochem. Technol., 6(7 to 8): 231-235, July to Aug. 1968. 7 refs.

The corrosion rate of a metal in an acid with a normality between N/1 and N/10,000, such as H2SO3, HNO3, H2SO4, or HCL, was found to be related to the concentration of the acid in accordance with the equation Corrosion rate equals a x (Acid Normality) to the b power, where a and b are constant for each combination of acid and metal and where temperature is 25 C. By determining the values of a and b for a number of acid-metal combinations, it was possible to compare the corrosion rates of the various metals in sulfurous acid with those of the same metals in nitric, sulfuric, and hydrochloric acids, and to determine the corrosion rate of the metals in sulfurous acid of different normalities. Data obtained show that nonstainless steel, with or without nickel, is highly susceptible to sulfurous acid corrosion. However, when a substantial proportion of chromium is present in an alloy which contains nickel, steel is free from corrosion by either sulfurous acid or nitric acid. Copper and chromium are not appreciably susceptible to sulfurous acid corrosion in solutions lower than N/1.3. Tin corrodes more rapidly than other nonferrous metals between N/100 and N/1000, but less than cadmium and zinc at N/10. Cadmium, Lead, and zinc corrode more rapidly in sulfurous acid than in nitric acid. Lead corrodes less rapidly in sulfurous acid than in nitric acid. Aluminum is rapidly corroded by hyperchloric acid but less so by nitric or sulfurous acid. The study concludes that sulfurous acid solutions causing the greatest damage in urban and industrial areas have abnormalities between N/1 and N/10,000.

4487 APTIC NUMBER 12945

McLeod, W. and R. E. Rogers
THE NATURE OF CORROSION OF ZINC BY SULFUROUS ACID AT ORDINARY TEMPERATURES. Corrosion, 25(2):74-76, Feb. 1969. 4 refs.

Corrosion rate data are presented for zinc in (1) a combination of sulfur dioxide, water vapor, and air; and (2) aqueous solutions of sulfurous acid in the absence of air, at 70-75 F. The average corrosion rate of zinc exposed to a moving mixture of sulfurous acid and air was 24.7 mils/yr during the first seven days of exposure. The rate decreased until it became constant at 5.0 mils/yr after 500 days. The corrosion products were sulfur, zinc sulfite, and zinc sulfate. The corrosion rate of zinc completely immersed in an unaerated solution of sulfurous acid was much higher and increased as the acid concentration was increased. In a solution containing 8.0 g/L of sulfur dioxide, the average corrosion rate was 279 mils/yr; in a solution containing 16.0 g/L of sulfur dioxide, the average rate was 496 mils/yr.. An insoluble corrosion product appeared on the metal during immersion whose nature could not be determined. As the sulfurous acid content of the unaerated solutions decreased due to corrosion, hyposulfite, sulfide, thiosulfate and elemental sulfur were produced. The first two products decreased considerably, but elemental sulfur and thiosulfate continued to increase. The important reactions involved in the corrosion of zinc by sulfurous acid are given.

4488 APTIC NUMBER 13507

Plumley, A. L., E. C. Lewis, and B. G. Tallent
EXTERNAL CORROSION OF WATER WALL-TUBES IN KRAFT RECOVERY FURNACES. TAPPI, 49(1):72A-81A, Jan. 1966. 3 refs.

A test program designed to provide information leading to the prevention of recovery furnace tube-metal waste has been in progress for over five years. This progress report discusses the temperature limitations for the carbon steel used for heat adsorption surfaces, the corrosion resistance of various coatings under operating conditions, and results obtained from corrosion and deposit probes installed in recovery furnaces. Analytical data from laboratory tests of the chemical composition of deposits, smelts, and gases in various regions of a furnace are included. It is concluded that accelerated wastage for SA 192 metal begins at metal temperatures between 625 and 650 F. Field and laboratory studies suggest that a gas-solid reaction is the cause of wastage. In the area below the primary air ports, where corrosion is greatest, there are localized concentrations of oxygen, carbon dioxide, and sulfur-containing gases. If oxygen is sufficiently high, the hydrogen sulfide concentration is minimized. Sulfur dioxide concentrations do not appear to be affected by fluctuations in carbon or oxygen concentrations. Most of the coatings tested would prevent extensive wastage. Examination of one furnace metallized with aluminum indicates that this method is satisfactory for the area of the furnace walls above the primary air ports. The area below may require expanded metal shields packed with chrome Super 3000 refractory or pegs packed with chrome-ore refractory.

4489 APTIC NUMBER 13681

Thomson, A. G.
DEPOSITS ON BOILER PLANT HEATING SURFACES. Eng. Boiler House Rev., vol. 69:269, 1950.

The role played by SO2 and SO3 in the formation of bonded deposits on boiler superheater tubes was investigated under experimental conditions. A mixture of flue gas containing SO2 and radioactive SO3 was passed over sodium chloride at various temperatures. By measuring the activity of the sulfate produced,

the percentage of sulfate derived from the SO3 was determined. Corrections to allow for oxygen exchange between the SO2 and the SO3 were made by determining the activity of the exit SO2 and SO3 gases. The amount of sulfate formed at low temperatures was not great, but a considerable amount was formed as the temperature was increased. Above 650 C, most of the sulfur was derived from SO2. The addition of a catalyst resulted in the production of sulfate from SO2 at temperatures as low as 300 C. With SO3, the rate of reaction was unaffected by the catalyst. The evidence that Na2SO4 in boilers is derived largely from SO2 implies that the sulfur content of a fuel is an important consideration in the formation of bonded deposits.

4490 APTIC NUMBER 12588

Talley, G.
THE CATALYTIC OXIDATION OF SULPHUR DIOXIDE ON METAL SURFACES. PART I. J. Soc. Chem. Ind. Vol. 67, p. 369-373. Oct. 1948. 4 refs.

A mild steel surface can induce catalytic oxidation of SO2 due to the formation of Fe2O3. The optimum temperature of the catalytic action is 650 C. The catalytic activity of the steel surface increases on exposure and reaches a maximum after 12 hours. Aluminum sprayed and aluminized surfaces are both less catalytically active than mild steel after long exposure to SO2 at 600 C. The aluminized is the least catalytic of the surfaces tested. The presence of water vapor leads to a decrease in catalytic oxidation on all surfaces tested. The percentage conversion is approximately inversely proportional to the gas velocity over the surface of the metal. Since the gas treated in unit time is proportional to the flow-rate, the absolute conversion rate is independent of gas velocity. The rate of combustion of SO2 and oxygen at a mild steel surface at various temperatures with dry and moist gases have also been measured. Sulfide and sulfate formation is found to occur simultaneously, the sulfide being concentrated near the surface of the basis steel. The rate of sulfate formation is greatest between 580 and 635 C, corresponding to the maximum catalytic activity of Fe2O3. Water vapor inhibits sulfide and sulfate formation, but increases the rate of oxidation.

ECONOMIC ASPECTS

4491 APTIC NUMBER 13074

Carlson, Jack W.
WHAT PRICE A QUALITY ENVIRONMENT. J. Soil Water Conserv., 24(3): 84-88, May-June 1969. 2 refs.

In a free enterprise system the costs of environmental improvements should be borne by those benefitting from pollution abatement efforts. This approach will insure consumer rather than governmental control of environmental standards, carefully identify costs and benefits, and encourage polluters to find the least expensive control methods. Society should control environmental quality to a greater extent only when pollution damage exceeds the cost of additional control. It should resist further expenditures for environmental quality when the cost of the quality control is greater than the damage inflicted. An ideal standard exists when control costs equal the benefit of control. If this criteria is accepted, maintaining an existing ecology is not necessarily good for bad; at times environmental degradation may be worth the benefits accruing from a new technology that caused it. Moreover, if costs are not related to benefits, standards will be determined by the relative bargaining strength of the beneficiaries and the polluters. A recent federal study has shown that the cost to society of limited air and water pollution abatement would be $1.6 billion a year. Abatement costs for manufacturing firms and electric power plants, except for thermal pollution, were estimated at $.6 billion. The study also indicated that industry's portion of annual costs for amortization of necessary plant and equipment expenditures is relatively small. If all abatement costs are passed on to consumers without a change in the quantities of goods sold, the yearly per capita costs to city dwellers will be $30 by 1985.

4492 APTIC NUMBER 13150

Holme, A.
THE ECONOMICS OF CORROSION AND CORROSION CONTROL. Anti-Corros., 16(2):12-17, Feb. 1969. 8 refs.

Metal corrosion represents both direct and indirect expenses to industry and private consumers. Besides the actual cost of replacing corroded parts, economic losses due to production stoppage must be considered. Other problems associated with corrosion include the loss of efficiency of an installation, contamination of the product, and overdesign to give an extended operating life. The unpredictable failure of critical parts of aircraft, cars, ships, trains, or industrial equipment can cause accidents which add to the economic losses. Methods of estimating the true cost of corrosion and corrosion control are given. Corrosion can be reduced by galvanizing, coating with a zinc-based spray, or painting. Each of these methods represents an investment of time and money. Appraisal of investment projects can be made through the methods of payback, annual rate of return, or discounted cash flow techniques. The payback system favors methods in which the original capital outlay is recouped in the shortest period of time. The annual rate of return system relates before tax or after tax earnings to the initial capital. The discounted cash flow system takes into account the interest that can be earned on potential savings or profits, and therefore accounts for the timing of returns. Several examples of cost analysis are supplied.

4493 APTIC NUMBER 13478

McNally, Edward T. and Robert C. Woodhead
GAGING THE COSTS IN COAL-PREPARATION PLANT SELECTION. Coal Age, 71(8):78-84, Aug. 1966.

Construction and operating costs of coal-preparation plants were studied by flowsheet analysis of the following models: (1) a medium-size 400-tph plant where 50% of the feed is minus 1 in; (2) a large 800-tph plant where 50% of the feed is minus 1 in; (3) a 400-tph plant where 75% of the feed is minus 1 in; and (4) a 400-tph plant where 25% of the feed is minus 1 in. Analysis of building costs indicated that two plants totalling 800-tph capacity cost approximately 25% more in capital outlay than one 800-tph plant. Analysis of operating costs led to the conclusions that total costs per ton for 1966, including amortization, is 31 cents for plant 1 as compared with 22 cents for plant 2. Accumulated price totals are tabulated and charted to show cost buildups for 18 functional sections, among them raw-coal unloading, raw-coal breaking, raw-coal storage and cleaning, coarse-coal cleaning, fine-coal cleaning, refuse and middlings handling, and clean-coal handling.

4494 APTIC NUMBER 12979

Verner, W. C. and H. S. Edsall
ANALYSIS OF ECONOMIC FACTORS IN CATALYTIC AIR TREATMENT. Air Eng., vol. 38-39, 41-42, 50, Oct. 1965.

Catalytic equipment has other functions, both primary and secondary, which are separate from odor control. Whenever combustible vapors are contained in a gas stream, the potential exists for energy recovery through catalytic combustion. Two case studies illustrate how energy can be recovered and used as heat with a lowering of direct fuel costs. In one instance, the combustion of solvent vapors in a solvent evaporation oven, is accomplished by a catalytic installation combined with a heat exchanger. A significant amount of fuel is produced. In the second case, a catalytic decondensation installation on an automotive paint bake oven effects the required dilution of solvent vapors at less expense than the method of increasing fresh air. When the solvent vapors are oxidized, heat is released which may be used to help heat the oven.

4495 APTIC NUMBER 13870

Yocom, J. E.
THE COST OF AIR POLLUTION - EFFECTS AND CONTROL. Tenn. Ind. Hyg. News, 25(3):1-3, 1968. 3 refs. (Based on a talk presented at the Tennessee Valley Industrial Health Conference, Gatlinburg, Tenn., Sept. 19, 1968.)

The problem in determining costs of air pollution is isolating the costs due to air pollution from those that occur in its absence. By the use of questionnaires in two or more communities similar in all respects except degree of pollution and assigning typical costs relating to air pollution, it was found that costs ranged from $30-40/capita for some of the sparsely settled areas to $240/capita in Washington, D. C. These costs are mainly borne by individuals and belong to four categories: exterior walls and windows of frame houses, interior walls, windows, draperies, rugs, and upholstery, laundry costs for clothes; and women's hair and face care. These surveys do not assess costs for maintenance of masonry and screens, vegetation damage, or loss in property values. Costs resulting from installation and operation of air pollution facilities are also passed on to the consumer. If a high level of control were obtained through the institution of sulfur dioxide controls in power plant stack gases, the ultimate in automobile control available at present, and pollution-free rubbish disposal, the price for cleaner air would be $2.75 billion per year. This level of control might reduce air pollution emissions by 0.66%.

4896 APTIC NUMBER 13173

McCune, D. C.
THE TECHNICAL SIGNIFICANCE OF AIR: FLUORIDE CRITERIA FOR VEGETATION REFLECT THE DIVERSITY OF PLANT KINGDOM. Environ. Sci. Technol. 3(8):720-735, Aug. 1969.

Problem areas in the development of air quality criteria and the application of standards are (1) the nature and occurrence of the pollutant, (2) the effects of the pollutant on a receptor and the factors that determine the dose-response relationship, and (3) the characteristics of present air monitoring techniques. Atmospheric fluorides present specific problems in each area and illustrate problems of general significance with respect to the effects of air pollution on vegetation. Criteria, for example can be established only for gaseous fluoride pollutants. However, if air quantity standards are to be meaningfully evaluated and enforced, monitoring techniques must be developed that can discriminate between particulate and gaseous forms. Soundly-based criteria and standards must also consider the temporal distribution of atmospheric fluorides. Unfortunately, not enough is known about the effects of fluorides on plants to allow the formulation of concentration, duration, and frequency parameters. It is doubtful that continuous function can describe the effects of fluorine under given biological and environmental conditions. A better method for presenting criteria is a dose-response surface for an effect of a certain degree and type in terms of the probability of its occurrence. If standards are to be useful, the art of determining fluoride levels must be refined. Acceptable standard monitoring methods may result from the work of the Halogen Subcommittee of the Intersociety Committee on Manual of Methods for Air Sampling and Analysis. Included is a discussion by P. H. Daines of the implication of standards for industrial plant design. Variations in plant sensitivity to fluorides are discussed by H. H. Hickey.

4497 APTIC NUMBER 13124

CLEANER AIR FOR THE 1970'S. Automotive Inform., 6(4):2-3, Jan. 1969.

A new $12 million, three-year Coordinating Research Council (CRC) program on automotive contributions to air pollution sponsored by the automobile and oil industries has attracted Federal sponsorship of some phases, and so far spawned 10 projects since the announcement date. Work in progress includes a study of driving habits of American motorists to develop data useful in refining testing techniques for automotive emission control systems, a mass study of Los Angeles driving patterns, a study of diesel exhaust odors, a study of odor components in exhaust, a study of the effect of carbon monoxide on behavior and performance, a study of toxicity of aromatic hydrocarbons in the lung, and a study of the synergism of air pollutants in urban environments.

4498 APTIC NUMBER 13075

Bastian, Robert E.
'AIR BASIN' POLLUTION CONTROL. Penn. Health, 30(2):10-12, Summer, 1969.

Air basins are defined as areas affected by air contaminants from a large number of concentrated or scattered sources, and influenced by common meteorological and topographical factors. From its beginning in 1961, the Pennsylvania State Air Pollution Commission recognized the health hazards posed by such pollution areas and planned for their control. The Commission provided limitations within each basin for the emission of smoke, dusts, and other pollutants into the atmosphere, and has developed an air pollution warning system. Through use of mathematical calculations and other evaluation techniques, the potential rates of contaminants emitted into the atmosphere from every pollution source within the basin will be determined by Health Department engineers. If the permissible rate of emission is exceeded, the Department will take steps to control the pollution. Air quality criteria developed by the State Air Pollution Commission, together with the commission's regulations, are a major step toward meeting Federal control standards, and toward implementation and enforcement plans for the two Federal air basins located in the Philadelphia and Pittsburgh areas.

4499 APTIC NUMBER 12578

Bliss, A. H.
AHEAD. A COLLEGE OF ENVIRONMENTAL HEALTH AND URBAN DEPARTMENT OF ENVIRONMENTAL HEALTH. J. Environ. Health, 31(2):119-125, Sept.-Oct. 1968. 12 Ref.

Environmental health requirements of the community can best be accomplished by consolidating the professional and semiprofessional groups interested in the environment into a single Department of Environmental Health Services. The major educational institutions should work constructively with the community. The university could develop a college of environmental health which through research and education can train the environmental health scientist and teachers to staff the state colleges. The state colleges can develop undergraduate programs to educate the environmental health technologists, and the junior colleges can train the environmental health technicians of the future.##

4500 APTIC NUMBER 13175

Bouquiaux, J., C. Collart, J. Grandjean, G. Wenquin, L. Patteet, J. Stassen, and W. Zuallaert
REPORT OF A BELGIAN INFORMATION MISSION RELATIVE TO THE PREVENTION OF ATMOSPHERIC POLLUTION IN FRANCE. (Rapport d'une mission belge d'information relative a la prevention de la pollution atmospherique en France). Text in French and Flemish. Ann. Mines Belg., no. 5:517-562, May 1969. 41 refs.

Coordination of air pollution research activities in France is officially directed by the Ministry of Social Affairs which has an Interministerial Consultative Commission for this purpose. Apart from this official action, technical working associations and committees have been established. These have created a coordinating committee to unite all research efforts and to advise the government on enforcement measures. The magazine Pollution Atmospherique is the official journal on the subject. Both the Hygiene Department of the Municipality of Paris and the Municipal Laboratory of the Police Headquarters are concerned with the diagnosis and prevention of atmospheric pollution, the former concentrating on air quality measurements and the latter on the effect of automotive emissions on health. The Municipal Laboratory has evolved a rapid method of measuring the amount of carbon dioxide in blood. Certain sampling and analyzing methods are now standardized in France, but improved techniques are being developed by Electricite de France. The National Institute of Applied Chemistry Research is carrying out research on the genesis and properties of dusts and aerosols, on filters likely to retain them, and on measurement devices, separators, and purifiers. The Technical Union of Motor Cars, Motor Cycles, and Bicycles is studying techniques for reducing pollution caused by motor vehicles. Provisions for counteracting industrial pollution and odors are incorporated in the law of Aug. 2, 1961. The law and its application are subject to two fundamental needs: the preservation of health and the development of industry. (Author summary modified)

4501 APTIC NUMBER 13890

Brooks, Douglas L.
INDUSTRIAL DEVELOPMENT AND POLLUTION CONTROL: FRIENDS OR FOES/ AIDC J., 3(3):1-13, July 1968. 10 refs.

Environmental pollution increases with every rise in total population and in industrial expansion. By 2010, approximately 322 to 438 million people will inhabit the U. S., and the gross national product will increase accordingly. The

Preceding page blank

accompanying environmental pollution must be controlled. Merely striving to make wastes innocuous by better waste treatment is not enough, and by-product recovery is necessary. Total recycling of manufactured materials is needed so that consumer waste products can be reused by industry. To accomplish pollution control, it will become obvious that three campaigns are crucial: the campaign for standards, the campaign for control authority, and the campaign for incentives. Community groups are needed to spur movements which will hopefully end in control by the joint action of all governmental levels. All future uses of air, water, and soil must be placed in perspective and regional goals for the environment must be established.

4502 APTIC NUMBER 13152

INTERPRETATION OF SOME RULES ISSUED FOR THE AIR POLLUTION LAW NO. 615 ENFORCEMENT. (Chiarimenti interpretativi per l'applicazione del regolamento per l'esecuzione della legge 615 contro l'inquinamento atmosferico). Text in Italian. Condizionamento dell'Aria, Riscaldamento Refrigerazione (Air Conditioning Heating Cooling), 13(4):183-184, April 1969.

The Centro Riscaldamento Combustibili Liquidi (Liquid Fuel Heating Center) has organized several meetings among various Associations to explain some aspects of Air Pollution Law No. 615 and to interpret the rules issued for its enforcement. 1) Thermal capacity is defined as the quantity of heat that can be produced per hour in one or more combustion chambers of a given heating system. It is calculated by multiplying the minimum heat value of the fuel by the maximum amount of fuel the system is able to burn in one hour. It is estimated that the minimum heat value of fuels ranges from 9760 to 10,290 kg.cal per Kg, according to the type. 2) The volume of the combustion chamber must not be less than 1/30 of its total surface. Different ratios apply to other heating systems according to their thermal capacity. 3) Chimney size also has to be proportional to the maximum thermal capacity of each heating system. 4) Gas sampling holes may be made at the top of the flue if it is impossible to make them at the base. 5) Systems with thermal capacities less than 1,000,000 kg.cal/hr may be equipped with one thermometer, to indicate flue gas temperature. Systems with greater capacity must also be equipped with pressure gauges and special devices to indicate CO2 and CO = H2. 6) By 'general equipment' the Law means gas sampling holes, thermometers, gauges, etc. which must be made or installed within one year. 7) The tanks must conform to the specifications of the Law within ten years. 8) The forms or applications for adapting existing heating systems to the specifications of the Law must be filled at the Firemen's Headquarters of the appropriate province.

4503 APTIC NUMBER 13585

Dirkes, W. F. and A. A. Watts
A SYSTEMS APPROACH TO FORECASTING. Mater. Design Eng., 64(7): 102-105, Dec. 1966.

The systems approach to planning materials research and development is an analysis tool which materials engineering uses to help management set its long-range company goals. Industry goals are analyzed for the materials problems they present, and critical material properties required to attain these goals are defined. The present state of the art in each critical materials area is reviewed and compared with the forecast of materials requirements. The effort required to close the technical gap and the chances of success also are estimated. Management then considers this analysis together with business, legal, economic and other technical factors to decide which area of space system development warrants concentrated company effort. Finally, research efforts in the materials engineering department are allocated in accordance with the overall objectives defined by management.

4504 APTIC NUMBER 13800

Felix, R.
THE REGULATION OF ATMOSPHERICAL POLLUTION. (Reglementation de la pollution atmospherique). Text in French. Rev. Hyg. Med. Soc., 16(2):175-198, 1968.

Air pollution, caused by domestic furnaces, automobile traffic, and industrial installations, has grown rapidly in various countries. Since public health is jeopardized, a number of countries are attempting to suppress or reduce pollution by imposing limits on the amount of noxious substances contained in emissions. As illustrated by a recent Italian law, noncompliance with these measures can sometimes result in severe penalties. However, disciplinary measures would be ineffectual without technological means for achieving air pollution control. Present techniques fall into two categories. Special equipment or thermal processes can be used to check noxious dusts and gases. Of greater interest to industry are methods for producing clean fuels that can be utilized as a source of heat. The advantages secured by this method are so perceptible that by comparison, the reduction and elimination of air pollution are considered secondary by industry. Federal or regional air pollution regulations now in effect throughout the world are summarized.

4505 APTIC NUMBER 12941

Gazivoda, Vladimir and Leonard Putz
AIR POLLUTION IN THE SFR OF YUGOSLAVIA AND LAW REGULATIONS FOR THE SANITATION OF ENVIRONMENT. (Aerozagadenja u SFRJ i zakonski propisi koji se odnose na sanitaciju okoline). Text in Serbo-Croatian. Kem. Ind. (Zagreb), 5:323-326, 1969. 4 refs.

The influence of air pollution on human health, particularly in the respiratory system, is discussed. Data on the situation in cities throughout the world and in Yugoslavia are also given. Laws and regulations designed to secure more favorable hygienic and sanitary conditions are cited. (Author abstract modified)

4506 APTIC NUMBER 13914

Grosse, Robert N.
SOME PROBLEMS IN ECONOMIC ANALYSIS OF ENVIRONMENTAL POLICY CHOICES. In: Proceedings of Symposium on Human Ecology, Washington, D. C. Nov. 24-27, 1968, Washington, D. C., Dept. of Health, Education, and Welfare, Consumer Protection and Environmental Health Service, 1969, p. 40-55. 13 refs.

The importance of economic considerations and potential usefulness of methods of economic analysis in deciding such environmental policies as subsidies, taxes, standards, and resource management are emphasized. Cost-benefit and cost-evaluation analyses may be particularly applicable to air pollution control decisions, especially in light of the recent development of techniques to simulate emission control processes, thus facilitating the determination of abatement costs. Social costs are more difficult to identify and measure, and relevant economic costs of control, such as higher costs for industry and effect on employment, must be considered. Preliminary evidence suggests that in the case of both air and water pollution, much control appears possible at rather modest costs.

4507 APTIC NUMBER 13204

Loos, Jaroslav
EMISSIONS THROWN OUT OF FACTORY CHIMNEYS. (Kominove exhalace prumyslovych zavodu). Text in Czech. Prumysl Potravin, 20(3):87-88, 1969.

Greater use of fuels containing sulfur with a high ash content and more frequent use of liquid fuels increase air pollution. Czechoslovakian public laws fix the maximum safe hourly concentrations of dust and sulfur ash at 0.5 mg/cu m and the maximum safe daily concentration at 0.15 mg/cu m. To comply with the law, designers of new factories should provide an estimate of emission of the gases (such as sulfuric acid) and maximal and average amounts of ash in g/s per hour, day, and year; emission of smoke; the height of the chimney; discharge velocity of the gases; caloric content of the smoke; height of the bottom of the chimney above sea level; elevation diagram of the surrounding territory; map of the ground with contour lines; representation on the map of the places that should be protected; and a diagram showing prevailing wind directions for a year. In addition to complying with the law, a new factory design should take into account the present condition of the site and the relative degree of industrialization in which it is to be built.

4508 APTIC NUMBER 13165

Mastin, T. W. and T. J. Sheahan
CLEAN AIR AND MOTOR VEHICLES. (Aria pulita a veicoli a motore). Text in Italian. Riv. Combust., 23(3):121-131, March 1969. 15 refs.

The U.S. Department of Health, Education and Welfare reported that 60.6% of all air pollution is produced by motor vehicles. Air polluting substances exhausted in large quantities are carbon monoxide, hydrocarbons, and nitrogen oxides. In 1947, the State of California began promoting research on air pollution and regulating its control. In 1960, it organized the Motor Vehicle Pollution Control Board. Federal legislation in this field started in 1966, and in January 1968, new rules were proposed. By June 1968, existing legislation was revised to include special rules on exhaust systems to be adopted by car manufacturers starting January 1, 1970. In November 1964, the Chrysler Corp.'s Cleaner Air Package system was approved. General Motors Corp. has adopted an air injection system called Man-Air-Ox. At the present time, methods for eliminating nitrogen oxides from automotive exhausts are being considered by many fuel and car companies. Concerning Diesel engines, the Morse report urges the Federal Government to take steps against fumes and odors emitted by trucks and buses with Diesel motors. Many efforts are being made by several industries on a cooperative basis. An example of this trend is found in the Inter-Industry Emission Control Program. First Mobil Oil Corp. and Ford Motor Co. agreed to spend $7 million in three years on studying and developing a system to control air pollution caused by motor vehicles. Later, other American and Japanese companies, and more recently the Fiat company of Italy, joined the IIEC program.

4509 APTIC NUMBER 12977

ON THE REGULATION OF ENVIRONMENTAL POLLUTION IN ENGLAND. (Eikoku no toshi kogai kisei ni tsuite). Text in Japanese. Netsu Kanri (Heat Engineering, Tokyo), 21(3):29-33, March 1969.

Great Britain has attempted to control water and air pollution by administrative action and legislation since 1388 when the Lighting and Watching Act was passed. Laws to prevent water pollution included the first Public Health Act (1848), the River Pollution Prevention Act (1876), the Sea Fisheries Regulation Act (1888), and the Alkali Works Regulation Act (1863). Recent water pollution legislation includes the Water Resources Act (1963), which established River Authorities and a Water Resources Board to administer inland waterways in England and Wales; the River Act (1951) regulating the quality of river effluents; the Public Health Act (1961) controlling industrial wastes discharged into municipal sewers; the Clean Rivers Act (1960); the Radioactive Substances Act (1960), and the Continental Shelf Act (1964). Water pollution laboratories of the Ministry of Technology are investigating processes for purifying sewage and industrial waste and studying the effect of waste on surface water. The Clean Air Act (1956) prohibits industry and houses from discharging dark smoke, while the Road Traffic Act (1930) regulates the emission of smoke from cars. The Clean Air Council appointed by the Clean Air Act provides advisory services on air pollution when requested. Main studies on air pollution are being conducted at the Ministry of Technology laboratories, but air pollutants are being measured on a nationwide basis.

4510 APTIC NUMBER 13069

Padovani, Carlo
HOW EXTREME ARE THE RULES AND THE DEFENSES AGAINST AIR POLLUTION/ (A che punto sono la normativa e le difese contro l'inquinamento atmosferico). Text in Italian. Termotecnica (Milan), 23(5): 264-268, 1969.

The new Law no. 615 against air pollution divides Italy into two parts according to factors such as density of population, geographical concentration of industries, meteorological conditions, etc. The law provides for three types of defenses against air pollution: the elimination or reduction of polluting substances, the separation of polluting substances from smokes and gases before they are vented into the surrounding air, and the reduction of their harmfulness. Enforcement must be directed first toward private heating systems. In this the law follows the example of London, Pittsburgh, Saint Louis and other large cities. Fuels used must burn easily and completely, even in small systems. However, the law is not at all clear in defining fuel quality. Furthermore, the same law often contradicts other rules on fires, tax evasion, etc. Besides the measures provided by Law 615, other actions must be undertaken in Italy to improve air quality. It is imperative to control the population density of urban areas, to increase green areas, to promote the use of electric heating systems, to further research pertaining to better-grade fuels, and to train special technicians for controlling air pollution.

4511 APTIC NUMBER 12514

Public Health Service, Arlington, Va., National Air Pollution Control Administration
REPORT FOR CONSULTATION ON THE MINNEAPOLIS-ST. PAUL AIR QUALITY CONTROL REGION. 43p., April 1969.

A report is presented which contains a proposal for the boundaries of the Minneapolis-St. Paul Air Quality Control Region and supporting studies on engineering and urban factors. A number of urban factors are relevant to the problem of defining air quality control region boundaries. A discussion is given of the following urban factors and how they apply to the Minneapolis-St. Paul area: location of population; population growth pattern; the location of industrial activity, and the industrial growth patterns. Governmental jurisdiction considerations are reviewed. The study of engineering factors indicates the location of pollution sources and the geographic extent of serious pollutant concentrations in the ambient air. Pollution sources are located by taking emission inventories. Pollution concentrations in the ambient air are estimated from both air quality sampling data and a theoretical diffusion model. This report itself is intended to serve as the background document for the formal consultation with appropriate state and local authorities.

4512 APTIC NUMBER 12515

Public Health Service, Arlington, Va., National Air Pollution Control Administration
REPORT FOR CONSULTATION ON THE METROPOLITAN BALTIMORE INTRASTATE AIR QUALITY CONTROL REGION. 48p., April 1969. 5 refs.

A report is presented which contains a proposal for the boundaries of the Metropolitan Baltimore Intrastate Air Quality Control Region and supporting studies on engineering and urban factors. The engineering evaluation was based on a study of meteorology, air pollutant emissions, and estimated and measured air quality levels. The emission inventory indicated the location of point and area sources, the quantity of pollutants emitted from these sources, and the resulting emission densities. These data were subsequently used in a diffusion model. The study of urban factors reviews existing political and jurisdictional considerations, current air pollution control programs, present concentrations of population and industry and expected population growth. The report itself is intended to serve as the background document for the formal consultation with appropriate State and local authorities

4513 APTIC NUMBER 13356

Sato, Ryuzo
ON THE PREVENTION OF AIR POLLUTION. (Taiki osen boshiho ni tsuite). Text in Japanese. Kuki Seijo (Clean Air-J. Japan Air Cleaning Assoc., Tokyo), 6(5):1-5, Nov. 1968.

Article 147 of the Air Pollution Law of 1959 established administrative facilities for controlling air pollution in Japan. There are now 20 regional air pollution centers, mainly in industrial areas, with the responsibility of limiting the amount of smoke emitted by factories and setting standards for automotive emissions. Factory owners must meet area emission allocations. The emission standard for sulfur oxides was recently revised to differentiate between chimney height and the quantity of smoke discharged. The standard for powdered dust remains the same. Standards for measuring automobile exhausts are based on the density of fume discharge under conditions of idling, acceleration, fixed speed, decreased speed, etc. The Ministry of Transportation is concerned about the amount of carbons and hydrocarbons emitted in areas of heavy traffic. Consideration is also being given to atmospheric pollution caused by the heavy oil used by steam power plants.

4514 APTIC NUMBER 13054

Savas, E. S.
FEEDBACK CONTROLS ON URBAN AIR POLLUTION. IEEE (Inst. Elec. Electron. Engrs.) Spectrum, 6(7):77-81, July 1969. 3 refs.

In many cities the present mode of operation of the local air pollution agency deals with code standards for combustion equipment. Scheduled and unscheduled inspections and observations of emission sources provide feedback and indicate

code violations. Enforcement procedures are then applied to secure compliance. An on-line air control monitoring system has been installed in several cities. Information from remote, unattended sensor stations is sampled automatically by a computer to permit rapid assessment of the current air quality throughout the area. This knowledge may be used to detect serious pollution conditions so that control action can be taken to reduce emissions. The data can also be analyzed to find the relation between pollution levels and emission sources. The sensor data usually include meteorological parameters such as wind direction and velocity, as well as air quality measurements. Given adequate meteorological and air quality measurements that indicate expected levels of pollutant concentrations a day or two in advance, the local control agency can issue directives for localized emergency control measures during the earliest stages of anticipated major and minor pollution episodes. Health standards should also be established, based on the analysis of medical data, and used to set air quality control limits.

4515 APTIC NUMBER 13358

Swager, William L.
TECHNOLOGICAL FORECASTING FOR PRACTICAL PLANNING. Petrol. Management, p. 61-67, July 1966. 10 refs.

It is hypothesized that technological forecasting can be practicable and will have a major impact on industry when more attention is directed to the material to be forecast and less on the method used for forecasting. Identification of change, an estimate of its consequences, and a plan of action to capitalize on it is recommended as aggressive business strategy. Two graphic models developed by Battell are presented to determine the forces stimulating change and the impact of these forces on competing petroleum technologies. The first relates possible changes in petroleum technology and changes in the environment of energy utilization. The second is an objectives network. These graphic models help in communicating a logic across laboratory-management interface to nontechnical executives and research scientists, a necessity in successful technological forecasting.

4516 APTIC NUMBER 13366

Japan. Prime Minister's Office.
1969 WHITE PAPER ABOUT PUBLIC NUISANCES. (Kogai hakusho). Text in Japanese. (Prepared in collaboration with 11 ministries and agencies, Government of Japan, for submission to the Japanese Diet). Tokyo, Printing Bureau of the Ministry of Finance, 1969, 230p.

This report summarizes the status, monitoring techniques, and management, including laws, of air and water pollution, noise and vibration, and soil erosion in Japan in April 1969. Particulate air pollutants in Japan are of four types: falling dust, which contains large particles and includes soot from burning coal or muddy dust; sulfur oxides, which are becoming increasingly important because of the increasing use of petroleum in recent years; floating dust, which has very small particles and includes mainly molecules of metallic compounds from burning materials and carbohydrates; and engine exhaust gas containing CO, NO2, hydrocarbons, and aldehydes. The amount of falling and/or floating dust has been gradually decreasing with the decreasing use of coal, especially in large industrial cities. At the same time, sulfur oxides, especially SO2, have been gradually increasing and have the highest concentration (more than 1.5 mg SO3/100 sq cm/day) in Kawasaki, Yokohama, Nagoya, Tokyo, Osaka, Muroran, and Yokkaichi. Among the harmful effects of polluted air on the human body, the ill effects on the respiratory tract (especially on the lungs) are most important. Chronic bronchitis, bronchial asthma, pulmonary emphysema, pulmonary fibrosis, pulmonary cancer, and cor pulmonale are the main lung diseases induced by polluted air. 3, 4-Benzopyrene, which is a component of automobile exhaust gas, was experimentally proved to be carcinogenic. In May 1962, the law entitled 'Provisions on the emission of smoke' was established to control the ambient air system, and three large city groups (Tokyo-Yokohama, Osaka-Kobe, and Kitakyushu) were designated as air-polluted areas. Several cities, including Yokkaichi, were subsequently designated. This law was improved in May 1968, especially from the viewpoint of prevention. A law which sets limits for automobile exhaust-gas emissions has also been in force since September 1966. Air pollution is monitored in Japan at more than 170 points. In recent years, several techniques of preventing air pollution have been devised with varying success: use of activated carbon or activated manganese dioxide to reduce SO2 concentrations; quantitative and qualitative measurement of air pollution severity using a simulation model of a polluted area; modification of internal-combustion engines; and development of electric automobile engines.

4517 APTIC NUMBER 13917

Wroth, William F.
CE COST FILE NO 42: FACTORS IN COST ESTIMATING. Chem. Eng., 67(20):204, Oct. 17, 1960.

Preliminary, order-of-magnitude cost estimates for process equipment are obtainable by easily used factory techniques. When cost of one capacity of equipment is known, the 'six-tenths factor' rule approximates the cost of another capacity of the same equipment. A second factoring technique important to preliminary estimating is the updating of historical costs to the current economy. Current costs are approximated when old costs of equipment are multiplied by the ratio of current index value to the index of the date of the old cost equipment. Individual installation factors are tabulated for a variety of process equipment. For equipment not listed, the factor belonging to a physically similar item can be used. Installed cost of equipment from historical records of purchase cost can be determined by applying capacity, updating, and installation factors in whatever combination necessary.

4518 APTIC NUMBER 13861

Nedalia, Nahum Z.
CITIZEN PARTICIPATION AND ENVIRONMENTAL HEALTH ACTION: THE CASE OF AIR POLLUTION CONTROL. J. Public Health, 59(8):1385-1391, Aug. 1969. 38 refs.

The need for local citizen participation in community air quality control programs, and what such participation means or might entail within the context of American society today are discussed. In Pittsburgh, the Allegheny Conference on Community Development was formed as a privately financed, nonpartisan citizen organization to initiate a broad improvement program. In 1945, the United Smoke Council became an action committee of the Allegheny Conference. A similar movement took place in two small counties of the Lehigh Valley (Pa.) sites of large-scale cement production. In other cases, citizens' committees have served as continuous advisory bodies to governmental agencies concerned with air pollution problems. The leading example and exponent of the voluntary citizen approach to abatement of air pollution in American communities is the Air Pollution Control Association. Its core membership stands for maximum reliance on voluntary abatement of air pollution, and maximum decentralization of governmental enforcement of control. Future trends in citizen participation and the role of the Federal government in such programs are also discussed.

4519 APTIC NUMBER 13511

Sarkar, G. G. and N. K. Sarkar
AN INTEGRATED APPROACH TO EVALUATION OF COAL WASHING EFFICIENCY. Proc. of the 5th International Coal Preparation Congress, Oct. 3-7, 1966. 36 refs.

Sharpness Index and Integrated Efficiency were evaluated in the laboratory as measures of the overall efficiency of coal washing operations. Sharpness Index is defined as 100 times the ratio of total misplacements to the amount of near gravity materials minus 100. Integrated Efficiency is defined as the recovery efficiency of cleans times the percentage yield of cleans plus the recovery efficiency of sinks times the percentage yield of sinks divided by 100. It is concluded that the values of Sharpness Index and Integrated Efficiency may be of great help in ascertaining the precision of any coal washing operation, as well as in the comparative evaluation of results of one or more separating processes under varying conditions of washing. Both are expressed on a percentage basis and take into account the quantitative and qualitative factors of a washing operation. The partition curve and its derivatives are considered suitable and will continue to find wide application for the prediction of the probable results of washing different types of feed coal by a particular process.

4520 APTIC NUMBER 13387

Starr, Chauncy
SOCIAL BENEFIT VERSUS TECHNOLOGICAL RISK. Proc. Symp. Human Ecology, Warrenton, Va., p. 28-39, Nov. 24-27, 1968. (Sponsored by the Dept. of Health, Education, and Welfare, Consumer Protection and Environmental Health Service).

The empirical relationship between public safety and social benefit is traced for a limited number of activities such as use of electricity, mining accidents, general aviation, commercial aviation, and motor vehicle use. Illustrations are offered, together with some associated caveats and hypotheses, to show ways of approaching a rough answer to the question of 'how safe is safe enough/'. The results are applied to atomic power, as an example. The purpose of such an exercise is to illustrate a methodology for establishing performance 'design objectives' appropriate for new technology entering into social use. (Author abstract modified)

Preceding page blank

4521 APTIC NUMBER 13393

Aiken, Wm. B.
MEN AND MONEY. TAPPI, 50(6):42A-45A, June 1967.

Many of the major problems facing the paper industry have one thing in common: they require technically trained people to help solve them. These technically trained people are in short supply in all industries. The keys to an adequate supply of technical manpower in the paper are better utilization of every technical man already in the industry and attracting more new technical graduates to the industry. Better utilization will come when the companies and supervisors do a better job of orienting, training, understanding, utilizing, and rewarding technical men, and when technical men do a better job of continuing to grow, fitting into the organization, and refusing to stay in jobs beneath their capabilities. Industry must make the effort to sell high school students to go into science or engineering and to sell college students to enter the paper industry.

4522 APTIC NUMBER 12520

A. J. Benline
AIR POLLUTION - METROPOLITAN NEW YORK AREA. The Municipal Engrs. J., 54:33-42, 1968.

The pollution problems of New York City are reviewed. The unrealistic promises of improved air conditions are viewed as offering too much hope to the public with too little technological support for the position. The only hope for a successful control program is the wholehearted support of the Professional Engineer in order to avoid the imposition of solutions by the untrained and the unknowledgeable.##

4523 APTIC NUMBER 13022

Boyle, Matt
CLEAN AIR: INDUSTRY'S NEWEST PRODUCT. Mach., 75(11):72-73, July 1969.

Industrial air pollution control without loss of profit was discussed in reference to metalworking plants in Los Angeles County. Close to 50% of the air pollution from metalworking plants was attributed to foundries. Smaller contributors included hot forging, welding, heat treating, cleaning, and plating. The cost of air pollution control in Los Angeles appeared to be high, but this was because it was a pioneering effort. Plant managements were advised that despite the cost, metalworking plants could survive and prosper on clean air.

4524 APTIC NUMBER 13904

Brun, M.
AIR POLLUTION CONTROL. (Controle de la pollution de l'air). Text in French. Pollut. Atmos. (Paris), 11(42):85-90, April/June 1969.

The report of the interregional air pollution seminar, convened by the World Health Organization and held in Moscow-Volgograd from August 21 to September 20, 1967, is summarized. The objective of the seminar was to provide developing countries with directives for facing air pollution problems arising as a consequence of industrialization. Among the major areas of discussion are general problems and organization of pollution control, criteria and guides for air quality, surveys on air pollution and measuring methods, effects of air pollution on health, and the technology of air purification and prevention of air pollution of industrial origin. The organization of Soviet air pollution services, together with the state of research in the USSR, is reviewed. The necessity of establishing international recommendations for air quality criteria is stressed. These should be subject to periodical revision and changes dictated by scientific progress. However, standardization on an international scale of methods for analyzing pollutants is neither workable nor desirable. It is better to provide a choice of methods from which an air pollution laboratory can choose according to its facilities and objectives. A system for interlaboratory comparison of analytical methods and the exchange of norms and standards would be valuable.

4525 APTIC NUMBER 13854

Bryan, Robert J. and William M. Blackmore
CONTROLLED ATMOSPHERE EXPOSURE CHAMBER. Arch. Environ. Health, 18(5):848-854, May 1969. 6 refs.

A controlled environment chamber able to produce a wide range of exposure conditions was designed to provide data about effects of exposure to various combinations of air contaminant concentrations. A room-sized chamber was constructed capable of automatically maintaining levels of single or mixed contaminants for prolonged periods. The system can add specific contaminants to the natural smog or filter them out or do both. The chamber can house 20 dogs or subhuman primates adequately. Air flow is laminar from side to side. The animal caging allows free air flow to eliminate microenvironments different from the macroenvironment of the room, is adaptable to two or more species with somewhat different requirements, and allows safe handling of animals by research investigators. The cages are mobile, severe as metabolism racks, and are easily cleaned without disturbing the animal. The ventilation system, exposure room and cage design, gas injecting systems contaminant monitoring facilities, and system controls are described in detail. Performance testing of the exposure chamber is now underway. The experimental data indicate that the room is behaving as a thoroughly-stirred container. Therefore, 50% of the total concentration change can be attained within 2.5 min and 90% within 7.5 min.

Preceding page blank

4526 APTIC NUMBER 13587

Chamberlain, C. T. and W. A. Gray
COMBUSTION OF COAL IN OXYGEN. Nature, 216(5121):1285, Dec. 1967. 3 refs.

During an investigation of high-temperature flames, a burner system was developed which can burn up to 6 g/sec of coal in oxygen to form a stable, continuous flame. An integral part of this development has been a study of the mechanism which control the rate of combustion. Coal was ground and graded according to size by sieving and centrifugal classification in air to produce seven fractions ranging from 12 to 70 microns. Flame temperature was measured by the line reversal method which indicated a variation temperature along the length of the flame from 2900 to 3050 K. Each size fraction was burned at two ratios of oxygen to carbon: 2:11 and 1:51. Burning times were compared on the basis of the distances from the burner head necessary for 80% by weight of the coal to be burned. The extent of combustion was determined by a water-cooled sampling probe. It was found that for fractions between 12 and 30 microns there is a linear dependence of burning time on diameter. For fractions between 30 and 70 microns a better correlation was obtained when it was assumed that the burning time was proportional to the square of the diameter. As the particle size is reduced, a critical size will be reached when chemical processes begin to exert an influence on the combustion rate.

4527 APTIC NUMBER 13799

Clerk, Jackson
MULTIPLYING FACTORS GIVE INSTALLED COSTS OF PROCESS EQUIPMENT. Chem. Eng., 76(8):102-103, Feb. 10, 1969.

Multiplying factors were developed for application to purchase costs of columns, heat exchangers, pumps, compressors, fired heaters, and instruments. These factors give total installed costs, including indirect costs, of process equipment. They should be useful when a rough estimate is required. Erected cost factors were plotted vs material cost ratios, i.e., the cost of equipment made from some special construction material divided by the cost of the same equipment made from a standard material. The curves obtained can be used to calculate and compare the installed costs of equipment made from various types of material.

4528 APTIC NUMBER 13101

Davey, Tom (ed.)
INDUSTRIAL POLLUTION: THE MACABRE LEGACY. Water Pollution Control Fed. J., 107(7):14-17, July 1969.

There is modest anti-pollution research in Canada; more than half in water and very little in air pollution. The level of research must be increased several-fold to cope with the existing and expanding pollution problems occurring in Canada. In addition to increased research, industries must increase their pollution control equipment. A new tax proposal allows industry to ease the cost of control equipment installation by tax write-offs on all equipment installed before 1970. Local areas hesitate to enforce pollution regulations for fear of inhibiting future industry; Ontario's expanding industry and anti-pollution regulations show this fear unjust. Guideline tables for industrial waste treatment problems are presented.

4529 APTIC NUMBER 12257

Dept. of Commerce, Springfield, Va., Clearinghouse for Federal Scientific and Technical Information
A SELECTIVE BIBLIOGRAPHY OF U. S. GOVERNMENT R & D REPORTS ON AIR POLLUTION. 16p., Nov. 1968.

This selected bibliography contains titles of air pollution report literature announced in U. S. Government Research and Development Reports (USGPDR) during 1967-1968. These reports are available from the Clearinghouse. Ordering instructions are included.##

4530 APTIC NUMBER 13077

Ferrand, Edward
URBANAIR. Sci. Technol., no. 90:8-16, June 1969.

The atmosphere is polluted by burning fuels, by waste incineration, and by discharge of gas and aerosol by-products from chemical processing, manufacturing, construction and demolition. Air quality is strongly dependent on weather. When atmospheric inversions occur, pollutants cannot be dispersed, and consequently remain suspended in large concentrations above the city. A polluted atmosphere causes serious economic losses to society as a result of corrosion, defacement, and soiling of materials. Studies of mortality and morbidity indicate that the adverse effects of air pollution on human health are most serious in urban communities having the greatest concentration of pollutants. Motor vehicles produce large amounts of several pollutants including nitrogen dioxide, unburned hydrocarbons, and carbon monoxide. Fossil fuels contain sulfur and their combustion releases SO2 and lesser amounts of SO3. Sulfur oxides are released to the atmosphere by smelting plants, petroleum refineries, sulfuric acid plants, and power generating plants. Sulfur dioxide has received much attention and has been blamed as a major causative factor in many of the air pollution disasters, especially in conjunction with particulates. The Air Quality Act of 1967 attempts to define Federal, state and local efforts in the combined attack on air pollution. It provides for financial aid in the form of grants to state and local agencies for the expansion of research and development, for standards to control vehicular pollution, for Federal action in interstate pollution problems, and for emergency action by the Secretary of Health, Education and Welfare.

4531 APTIC NUMBER 13397

Fisher, G. H.
DERIVATION OF ESTIMATING RELATIONSHIPS: AN ILLUSTRATIVE EXAMPLE. RAND Corp., Santa Monica, Calif., Contract AF-49(638)-700, Proj. RM-3366-PR, 83p., Nov. 1962.

A step-by-step illustration of how statistical regression analysis may be used in the derivation of estimating relationships from historical data is presented. The specific example presented refers to an estimating relationship for air fram initial (non-recurring) tooling cost for manned aircraft. The objective is to show how initial tooling cost may be related to aircraft characteristics. Even though the information underlying the analysis is hypothetical, the example contains and illustrates many of the major problems encountered in other areas of cost relation ship--for example, a very small sample size, uneven distribution of observations in the sample over the ranges of the explanatory variables, the difficulty of ascertaining reasonably good explanatory variables, and non-homogeneities in the data. Linear normal regression analysis, a multiple regression analysis, and two curvilinear analyses, logrithmic regression and second-degree equation, are presented and explained. Example problems are given for all the mathematical analyses.

4532 APTIC NUMBER 12452

Fuchs, N. A.
AN ATTEMPT AT A CLASSIFICATION OF AEROSOL LITERATURE. Staub (English translation), 28(9):1-6, Sept. 1968.

A classification of the literature on aerosols has been proposed which would cover the following main groups: general, formation and production of aerosols, methods for aerosol investigation, separation of aerosols, utilization of aerosols in biology and medicine, atmospheric aerosols.

4533 APTIC NUMBER 13919

Gilfillan, S. Colum
THE PREDICTION OF TECHNICAL CHANGE. Rev. Econ. Statist. vol. 34: 368-385, Nov. 1952.

Predicting the future of inventions is complicated by the tendency of one invention to displace but also absorb previous inventions and by the unreliability of statistics of inventions. These are based on highly subjective and imperfectly formed judgments on the names, definitions, dates, and importance of inventions. Since only 15 to 20% of inventors at work today are motivated to patent their inventions, patent statistics clearly do not provide a reliable measure of American invention. Inventions today are pursued chiefly by the federal government, sometimes by other noncommercial organizations. According to statistics on the expenditures for organized research, patents have a significant role in 32% at the most of organized research, or 3% of invention proper. While two-thirds as many patents are issued to freelance inventors as to corporations, their value is assumed to be much less. Many industries operate under patent poolings or comity in mutual licensing, which weakens the incentive for patents even when royalties can be charged for them. Monopoly is prevalent, especially in the chemical industry, and also weakens the incentive for patents. The great mass of unpatentable inventions and discoveries is assumed to equal the patentable in value. The principle that inventions come in functionally equivalent groups makes it easier to predict the effects of inventions than to foresee the invention which will be most influential. This principle reveals that inventions are not the prime cause of social change.

4534 APTIC NUMBER 13412

Gregg, S. J.
ACTIVE SOLIDS. In: The Surface Chemistry of Solids. Reinhold Publishing Corp., New York, N. Y., 1961, Chap. 7, p. 300-328. 51 refs.

Where a laboratory or an industrial process involves the interaction of a solid with a gas, liquid or another solid, the nature of the reaction will depend on the chemical composition of the solid, but its rate will be determined by the type of pretreatment of the solid. Characteristics associated with activity appear when the specific surface of a solid is at least 1 square meter/gram. The surface contributing to the activity of the solid is the whole of that surface which is accessible to the molecules of the substance that is interacting with it. The methods of preparing active solids are aimed at developing large surface areas and producing an increased concentration of lattice imperfections. Fine grinding is the most obvious way of attempting to increase the area of a compact solid. The converse process is condensation, where the particles of the active solid are produced by aggregation of the ions, atoms or molecules of the parent substance; this may be accomplished by precipitation from solutions, condensation from the vapor phase, or in the preparation of evaporated metal films. The active solid will tend to lose its activity as soon as it is formed, essentially by a process of sintering. All the correct conditions required for preparing a solid, including time and temperature of heating, suitable starting materials, and the presence or absence of impurities are not yet known.

4535 APTIC NUMBER 13797

Haselbarth, John F.
UPDATED INVESTMENT COSTS FOR 60 TYPES OF CHEMICAL PLANTS. Chem. Eng., 74(25):214-215, Dec. 4, 1967. 2 refs.

Investment cost for 60 types of chemical plants as of the first quarter of 1967 are tabulated. Figures for typical plant size in tons per year, investment cost, investment per annual ton of product, and plant size factor are given. These costs are based on establishing a new plant on an existing, previously developed site. The total costs would have to include all

off-site facilities such as utility buildings, general services, etc., if an existing site was not used, and final investment figures would be 30 to 40% more. The enlargement of an existing plant would involve investment figures about 20 to 30% less than those shown. Although the ENR Construction Cost Index has increased from 400 to 1000, which would indicate a vast general increase in chemical plant construction costs, several factors offset this. Technical advances, coupled with the construction of multi-product plants and large single-product plants have actually lowered costs/ton output. As an example, the contact process for H2SO4 production has allowed twice as much acid to be produced for half the investment that was required 20 yrs ago.

4536 APTIC NUMBER 13949

Haydon, Brownlee
THE YEAR 2000. Santa Monica, Calif., Rand Corp., 1967, 35p., 6 refs. p. 3571. (Presented before the Chevrolet Academy at Wayne State Univ., Detroit, March 2 and March 23, 1967.)

This paper consists of predictions about all aspects of living at the beginning of the 21st century. Air pollution would be due mainly to internal combustion engine automobiles and refineries. Air pollution has changed our climate and the balance of nature and may also be related to various diseases. It is predicted that nuclear reactors will be substituted for coal, oil, and gas furnaces that now provide energy for factories and power plants. More important would be the abolition of the internal combustion engine. Trying to control emissions by adding devices or improving the efficiency of burning will not work. Carbon dioxide concentration is predicted to be 25% greater by the year 2000. No solutions are offered to the problems facing the future.

4537 APTIC NUMBER 13512

Hoveke, G. F.
ADDITIONAL FUEL RESOURCES VITAL TO NUCLEAR EXPANSION. Elec. World (12th Annual Nuclear Report), 167(24):93-98, June 1967.

Cumulative requirements for U3O8 for power production through 1980 approximates 170,000 tons. Present reserves could satisfy domestic requirements through 1980, but the need for additional reserves is apparent. The USAEC estimates additional reserves at 325,000 tons and the U.S. Geological Survey places them at 650,000 tons. Costs for 1967 estimate U3O8 at $6-$10/lb with mining of the ore being the largest cost factor. New processing techniques can be anticipated to lower costs and provide for the use of a lower grade of ore. The most significant area for reducing fuel costs appears to be in core performance and plant operation.

4538 APTIC NUMBER 13043

Hurley, J. H.
BITUMINOUS MINING METHODS. Mining Engr., 21(2):108-110, Feb. 1969

Means of increasing coal production to offset rising labor and mining supply costs are discussed. The total answer is not only in larger equipment, but in the other considerations such as roof control, type of bottom rock, ventilating systems and seam characteristics. Awareness of maintenance costs and the importance of greater machine availability are mentioned. High strength steels and special alloys are recommended for wider use in modern equipment. Dynamic electrical and mechanical improvements are suggested to decrease the number of failures and overloading. The United States Bureau of Mines is working on the problems of acid mine drainage, and is trying to develop a phage virus that will be capable of killing acid producing bacteria. New equipment and a scientific approach to problem solving are proposed as the reasons for the significant accomplishments being made in coal mining.

4539 APTIC NUMBER 12947

Japan Ind. Assoc.
ADVICE FOR PERMISSIBLE SEVERITY OF AIR POLLUTION AND UPPER LIMIT OF NOISE. (Kyoyo sodo nado no kankoku). Text in Japanese. Kuki Seijo (Clean Air-J. Japan Air Cleaning Assoc., Tokyo), 6(7):46-54, 1969.

Atmospheric constituents harmful to workers, including gases of any kind, steam fumes, smoke and dust within a work room are discussed. Permissible concentration depends upon the type of pollutant, duration of exposure, temperature and air pressure of the work room, degree of physical exertion, and individual sensitivity to the pollutant. Dust of less than 5 microns diameter in a work room is measured at a height of 1 to 1.5 m from floor level, using an electric vacuum cleaner, impinger, or tyndalloscope. Permissible upper limits of either noisy or high-pitched sounds are also discussed. Areas where noise lasts continuously for more than 5 hours was the object of this study. The level of noise in this area is defined as the maximum phon within one octave of a mean frequency of 500, 1000, or 2000 Hz. The upper limit of noise is 85 phon.

4540 APTIC NUMBER 13003

Karr, Malcolm H.
EFFECTIVE MANAGEMENT OF WATER, LAND, AND AIR RESOURCES. Water. Res. Std., 9(8):8-12, 63-64, Aug. 1969. 13 refs.

The interrelationship between water, land, and air pollution is discussed. Some industrial water pollution has been eliminated by burning the effluents that contribute to the problem. This kind of action often leads to an air pollution problem. Other practices involve land disposal of wastes. This can also contribute to air pollution, and it can pollute the groundwater system. Weather modification is thought of as an engineering scheme to improve water management by shifting the pattern of precipitation, increasing snowpack, and controlling snowmelt. However, the environmental effects, socio-economic impact, and legal and international aspects should also be considered. Because science

lacks an understanding of the natural processes, the assessment of existing air quality and the analysis of potential quality problems are hampered. The control of air quality depends on improving industrial processes and on removing or modifying undesirable political and legal constraints.

4541 APTIC NUMBER 12177

John T. Middleton
AIR QUALITY AS A CONTROLLING FACTOR IN LIFE PROCESSES. In: Biometeorology, Proceedings of the Twenty-Eighth Annual Biology Colloquium, 1967, William P. Lowry (ed.) p. 67-79, 1967. (8) refs.

The quality of air is determined by the uses made of it and by the pollutants injected into it by man. The quality of air varies for a number of reasons, but principally because of contaminants arising from economic and social developments throughout the world. Air pollution is one of the undesirable side effects of this growth and development. The extent, severity, and character of man-made air pollution are determined by the kind, number, and location of contaminant sources, the chemical reactivity and interaction of the pollutants, the topography of the land, the weather, the nature of the community, and the characteristics of the airshed.##

4542 APTIC NUMBER 13793

Mills, H. E.
COSTS OF PROCESS EQUIPMENT. Chem. Eng., 71(6):133-156, March 16, 1964.

Costs and installation times are given for the majority of equipment associated with chemical processing plants so that rapid preliminary estimates of capital investments can be made. Included in the collection are items relating to manufacturing equipment, fabrication, piping, instrumentation, power and electrical, building and construction, and yard improvements. The items are defined as to purchase cost, capacity, horsepower, size, and materials of construction to avoid error in interpretation and application. The costs given are considered as a 'norm' and must have appropriate factors applied for particular situations. They can be considered as a firm base adjustable to any particular deviation.

4543 APTIC NUMBER 13612

Mitchell, C. B. and F. C. Hopcroft
LIME KILN DUST RECOVERY SYSTEMS AT N.Z. FOREST PRODUCTS LIMITED. APPITA, 22(5):146-149, March 1969.

Scrubbing of lime dust from the kiln stacks at the Kinleith Mill of N.Z. Forest Products, Ltd. is achieved by different systems on each of the two kilns. The first system is based on a lime mud flash dryer and an Imarta scrubber, followed by a cyclone separator. Exhaust gases are fed into a circular venturi throat where four nozzles spray re-cycled slurry. The remaining dust particles are agglomerated and absorbed into the H2O stream. Total slurry recirculation rate is 200 gal/min with an average gas flow of 26,000 cu ft/min at 250 C. Efficiency tests show a potential recovery of 2 tpd of lime, of which 85% is recovered. The second system uses a Peabody scrubber in which the gas is saturated with sprays of re-cycled slurry and fresh H2O in a venturi throat ahead of the actual scrubber. The gas is then passed through plates with slots and orifices, where it is separated from the solution. Final removal of H2O is accomplished with a series of swirl baffles in the scrubber body. Corrosion and high pressure drop were defects that were corrected, although scaling is still a problem. The efficiency of the scrubber is high, the lime loses being less than 0.1 tpd of lime.

4544 APTIC NUMBER 13829

National Coal Assoc., Washington, D. C.
BITUMINOUS COAL FACTS 1968. 107p., 1968.

This biennial report, through text and tables, indicates that known reserves of coal can be recovered to meet present and future energy needs and that advances in mining and transportation have been matched by technological advances in the handling, burning, and processing of coal. It is estimated that coal now generates 53% of the nations electricity and 65% of the power produced in steam plants. In addition, it is predicted that coal will be converted to pipeline-quality gas to supplement dwindling natural gas supplies. Uranium breeder reactors will not even be competitive with coal by 2000. Bituminous Coal Research, Inc. (BCR) is already at work on a two-stage superpressure gasification process. Its coal-to-gas reactor has a capacity of 100 pounds of coal an hour. The best coals for the process are being revealed by coal petrography, which breaks the coal code and translates coal into coal constituents. BCR is also studying the removal of pyritic sulfur from coal during pulverization and before combustion and is mine-testing the continuous removal of float dust generated by coal-cutting machine. The report contains the following six statistical indexes covering the years 1920-1967: bituminous coal and energy; markets; production; transportation; manpower and safety; and reserves.

4545 APTIC NUMBER 13586

Rohrman, F. A., B. J. Steigerwald, and J. F. Ludwig
SO2 POLLUTION: THE NEXT 30 YEARS. Power, 3(5):82-83, May 1967.

Sulfur-dioxide emission levels in the U. S. are predicted to more than double within the next 20 years, and it is concluded that this pollution will come primarily from the combustion of coal and oil in power plants. The speed with which control techniques will be improved depends on fuel dedesulfurization methods, economics of bulk energy fuel, and levels of sulfur

dioxide that can be tolerated in urban atmospheres. Two control schedules are considered: the first assumes no early developments and no widespread use of effective gas cleaning methods, and the second assumes the maximum that would require immediate and vigorous research on methods of gas cleaning and desulfurization.

4546 APTIC NUMBER 13182

Slonim, W. Balfour and N. Karen Estridge
OZONE - AN UNDERESTIMATED ENVIRONMENTAL HAZARD. Environ. Health, 31(6):577-578, May/June 1969.

The widespread use of ozone has lead to increasing exposure to this gas. Equipment producing sparks, arcs, or static discharge, as well as ultraviolet or other ionizing radiation, produces ozone from molecular oxygen. Commercially available 'air purifiers', and 'deodorizers' in homes, hospitals, offices, elevators, and meat storage plants generate sufficient ozone to be hazardous under certain conditions of use and ventilation. The biochemical mechanism of ozone toxicity is under active investigation. Free radicals are probably the basic biochemical mechanism of ozone-induced cell damage. Ozone destroys sulfhydryl-containing compounds, and in this process free radicals may be produced. However, a more important theory of ozone toxicity involves an oxidative attack on the carbon-carbon double bond of unsaturated fatty acids, i.e., lipid peroxidation.

4547 APTIC NUMBER 12638

N. A. Wedros
THE NAVAL BIOLOGICAL LABORATORY. Naval Res. Rev., 22(1):1-9, Jan. 1969

Biological research has been conducted by naval personnel at the University of California since 1934. The present research programs of the Naval Biological Laboratory (NBL) are encompassed in three broad areas; Aerobiology, medical microbiology, and environmental microbiology. The development of instrumentation for the study of airborne particles is an important continuing function of the aerobiology laboratory. The medical microbiology program has developed techniques for working with virulent bacteria, fungi, and viruses. Studies of the persistence of microorganisms in atmospheres of different composition and a correlation of these studies with enclosed living quarters such as deep sea habitats, submarines, or special military housing are being made.##

4548 APTIC NUMBER 13168

Wasson, P. A. and M. M. Fine
EXPERIMENTAL CONVERSION OF HEMATITE TO MAGNETITE WITH SOLID REDUCTANTS. Bureau of Mines, Pittsburgh, Pa., Report 6338, 13p., 1963. 17 fs.

Roasting research involving small, batch experiments was conducted to explore the use of solid reductants for converting nonmagnetic iron ore to a magnetic type. Differences in reactivities of the carbonaceous reductants were reflected in wide variations in iron recovery. Lignite and lignite chars gave the best results; passable results were obtained with peat products and a high-volatile bituminous coal. A temperature of 650 C resulted in satisfactory reduction. Iron sulfide was considered as a reductant. It was objected to because incomplete oxidation results in a high sulfur content of the magnetic concentrate. This is not a great detriment because any residual sulfur would be decomposed when the concentrate was agglomerated, or it could be recovered by flotation and reused. The advantages of using solids reductants are lower cost per cubic foot of reducing gas, simpler installations, and less rigorous control of the furnace atmosphere required because of the presence of carbon in the bed. Future studies on nonmagnetic iron ore conversion with solid reductants should be directed toward the development of an efficient furnace or kiln where the reduction could take place.

SUBJECT INDEX

The terms listed in this subject index are those that most closely describe the information presented in the abstracts. Instead of the APTIC number, the NAPCA ABSTRACT BULLETIN (NAB) number is used to identify the abstracts. The NAB number is shown in the upper left corner of each abstract. This issue includes NAB numbers 3565 - 4548, which are tabulated below to facilitate use of the index.

Category	NAB Number
Emission Sources	3565 - [illegible]2
Control Methods	3643 - 3849
Measurement Methods	3850 - 3933
Air Quality Measurements	3934 - 3947
Atmospheric Interaction	3948 - 3961
Basic Science and Technology	3962 - 4363
Effects-Human Health	4364 - 4447
Effects-Plants and Livestock	4448 - 4477
Effects-Materials	4478 - 4490
Economic Aspects	4491 - 4495
Standards and Criteria	4496
Legal and Administrative	4497 - 4517
Social Aspects	4518 - 4520
General and Miscellaneous	4521 - 4548

SUBJECT INDEX

ABSORPTION
3633, 3637, 3648, 3652, 3668, 3693, 3703, 3704, 3710
3711, 3728, 3747, 3769, 3774, 3775, 3789, 3793, 3803
3805, 3820, 3831, 3855, 3883, 3964, 3967, 3980, 3992
3997, 4004, 4020, 4022, 4042, 4043, 4076, 4077, 4138
4149, 4196, 4232, 4242, 4248, 4266, 4312, 4334, 4341
4410,

ADSORPTION
3647, 3684, 3710, 3728, 3739, 3760, 3764, 3778, 3820
3963, 3966, 3967, 3989, 3993, 4004, 4005, 4043, 4050
4054, 4067, 4070, 4106, 4116, 4131, 4138, 4170, 4171
4172, 4180, 4202, 4209, 4212, 4237, 4240, 4247, 4260
4294, 4297, 4298, 4331, 4338, 4341, 4402, 4534,

AEROSOL GENERATORS
3875, 4532,

AFRICA
3888, 3941,

AFTERBURNERS
3630, 3656, 3659, 3662, 3709, 3725, 3728, 3739, 3780
3826, 3828, 3830, 4494,

AIR QUALITY CRITERIA
4496, 4498, 4524, 4539,

AIR QUALITY MEASUREMENTS
SEE ALSO: DUST FALL, EMISSION INVENTORIES, AND VISIBILITY
3585, 3629, 3635, 3850, 3868, 3871, 3890, 3898, 3917
3923, 3924, 3925, 3930, 3933, 3934, 3935, 3936, 3937
3938, 3939, 3940, 3941, 3942, 3947, 4052, 4088, 4159
4318, 4366, 4398, 4409, 4432, 4453, 4457, 4464, 4500
4511, 4512, 4514,

AIR QUALITY STANDARDS
SEE ALSO: MAXIMUM ALLOWABLE CONCENTRATION
4496, 4512, 4518,

AIR RESOURCE MANAGEMENT
4540,

AIRCRAFT
SEE ALSO: GAS TURBINES
4383,

ALDEHYDES
3714, 4027, 4069, 4242, 4375, 4395, 4401, 4541,

ALIPHATIC HYDROCARBONS
SEE ALSO: ETHYLENE AND METHANES
3604, 3629, 3798, 3805, 3864, 3934, 4019, 4069, 4242
4287, 4303, 4344, 4541,

AMMONIUM COMPOUNDS
3565, 3598, 3633, 3653, 3654, 3703, 3747, 3751, 3754
3756, 3789, 3803, 3831, 3835, 3965, 3975, 3993, 3994
4053, 4091, 4115, 4121, 4134, 4157, 4209, 4244, 4260
4314, 4396, 4432, 4453, 4464,

AREA SURVEYS
3573, 3946, 4377, 4423,

AROMATIC HYDROCARBONS
3764, 3798, 3867, 4150, 4181, 4209, 4275, 4305, 4349
4390, 4395, 4400, 4405, 4424, 4541,

ARSENIC COMPOUNDS
3609, 4006, 4284, 4356,

ASBESTOS
3646, 4293, 4338,

ASIA
3589, 3603, 3617, 3629, 3642, 3650, 3708, 3716, 3717
3723, 3726, 3727, 3734, 3736, 3737, 3738, 3741, 3759
3766, 3767, 3768, 3771, 3774, 3775, 3780, 3781, 3783
3785, 3806, 3815, 3833, 3845, 3846, 3877, 3880, 3885
3900, 3904, 3917, 3921, 3922, 3925, 3931, 3932, 3938
3940, 3945, 3953, 3958, 3967, 3974, 4040, 4075, 4108
4143, 4200, 4208, 4209, 4210, 4223, 4305, 4318, 4320
4321, 4323, 4337, 4409, 4419, 4446, 4472, 4483, 4485
4504, 4509, 4513, 4516, 4539,

ATMOSPHERIC MOVEMENTS
3933, 3936, 3942, 3948, 3949, 3953, 3957, 3960, 3961
4374, 4462, 4476, 4541,

AUTOMOTIVE EMISSION CONTROL
SEE ALSO: AUTOMOTIVE EMISSIONS
3571, 3605, 3629, 3640, 3656, 3684, 3687, 3689, 3695
3707, 3709, 3715, 3725, 3726, 3733, 3738, 3757, 3758
3762, 3768, 3780, 3801, 3819, 3826, 3834, 3844,

AUTOMOTIVE EMISSIONS
SEE ALSO: AUTOMOTIVE EMISSION CONTROL
3571, 3573, 3618, 3629, 3684, 3689, 3707, 3715, 3725
3733, 3757, 3762, 3763, 3780, 3782, 3819, 3844, 3895
3939, 3946, 4375, 4377, 4497, 4500, 4508, 4513, 4516

BARIUM COMPOUNDS
4234, 4302, 4322,

BENZOPYRENES
3626, 4387, 4389,

BERYLLIUM COMPOUNDS
3944,

BOILERS
3586, 3620, 3621, 3635, 3642, 3654, 3662, 3677, 3679
3683, 3701, 3702, 3729, 3783, 3825, 3838, 3842, 4143
4154, 4328, 4489,

BORON COMPOUNDS
4302, 4343, 4349,

BRONCHITIS
4013, 4201, 4366, 4370, 4393, 4394, 4404, 4413, 4442

BY-PRODUCT RECOVERY
3594, 3597, 3624, 3628, 3637, 3644, 3651, 3653, 3657
3661, 3673, 3677, 3680, 3686, 3691, 3693, 3700, 3703
3711, 3713, 3714, 3720, 3746, 3751, 3753, 3766, 3770
3773, 3786, 3787, 3794, 3795, 3803, 3832, 3838, 3849
3962, 3997, 4014, 4015, 4047, 4049, 4062, 4176, 4188
4198, 4232, 4249, 4251, 4326, 4336, 4343, 4346, 4355
4494, 4501,

CADMIUM COMPOUNDS
3576, 3579, 3855, 4039, 4141, 4275, 4308, 4407,

CALIBRATION METHODS
3854, 3920, 4119, 4208, 4305, 4360,

CANCER
4389, 4423, 4516,

CARBON MONOXIDE
3565, 3605, 3629, 3662, 3666, 3709, 3758, 3763, 3805
3819, 3861, 3890, 3921, 3932, 3934, 3939, 3988, 4014
4028, 4060, 4084, 4085, 4114, 4159, 4213, 4245, 4267
4366, 4375, 4377, 4381, 4383, 4386, 4389, 4391, 4398
4414, 4439, 4502, 4511, 4512, 4516, 4541,

CARCINOGENS
4387, 4389,

CATALYSIS
SEE ALSO: CATALYTIC OXIDATION
3633, 3647, 3656, 3663, 3676, 3681, 3709, 3756, 3759
3781, 3782, 3796, 3805, 3822, 3823, 3828, 3902, 3962
3964, 3965, 3985, 3986, 4004, 4023, 4041, 4042, 4051
4055, 4066, 4069, 4085, 4102, 4105, 4116, 4160, 4163
4174, 4179, 4217, 4222, 4223, 4236, 4240, 4241, 4299
4309, 4317, 4324, 4326, 4331, 4344, 4349, 4355, 4490

CATALYTIC OXIDATION
SEE ALSO: CATALYSIS
3566, 3647, 3659, 3664, 3665, 3673, 3675, 3677, 3710
3736, 3743, 3758, 3796, 3800, 3810, 3811, 3819, 3826
3830, 3833, 3838, 3924, 3963, 3986, 4041, 4042, 4043
4070, 4090, 4160, 4161, 4174, 4226, 4240, 4295, 4296
4297, 4298, 4299, 4338, 4355, 4490, 4494,

CENTRIFUGAL SEPARATORS
3579, 3582, 3596, 3646, 3663, 3671, 3688, 3698, 3739
3745, 3777, 3799, 3802, 3814, 3837, 4012, 4188, 4274

CHEMICAL REACTIONS
SEE ALSO: PHOTOCHEMICAL REACTIONS
3582, 3590, 3598, 3625, 3626, 3633, 3639, 3642, 3648
3651, 3652, 3657, 3668, 3676, 3694, 3704, 3709, 3718
3721, 3746, 3751, 3756, 3815, 3820, 3822, 3825, 3830
3839, 3847, 3855, 3858, 3898, 3914, 3959, 3962, 3965
3973, 3975, 3979, 3982, 3985, 4001, 4003, 4007, 4010
4014, 4015, 4026, 4030, 4040, 4041, 4042, 4051, 4056
4057, 4061, 4069, 4072, 4078, 4088, 4089, 4091, 4096
4102, 4105, 4114, 4116, 4117, 4118, 4123, 4128, 4137
4142, 4152, 4159, 4162, 4169, 4173, 4179, 4180, 4203
4205, 4210, 4216, 4217, 4219, 4221, 4222, 4223, 4227
4234, 4235, 4236, 4242, 4249, 4250, 4252, 4255, 4262
4270, 4271, 4273, 4279, 4280, 4282, 4283, 4287, 4299
4302, 4318, 4324, 4329, 4331, 4342, 4344, 4345, 4350
4351, 4361, 4362, 4490, 4548,

CHILDREN
3574, 4081, 4135, 4367, 4404, 4430, 4436,

CHLORINE COMPOUNDS
SEE ALSO: HYDROCHLORIC ACID AND HALOGENATED HYDROCARBONS
3627, 3683, 3736, 3769, 3770, 3874, 3887, 4006, 4101
4109, 4200, 4232, 4264, 4277, 4290, 4396,

CHROMIUM COMPOUNDS
3588, 3907, 4041, 4046, 4103, 4119, 4205, 4308, 4341

CIRCULATORY SYSTEM
3994, 4141, 4157, 4201, 4306, 4375, 4381, 4400, 4421

COAL
3584, 3589, 3591, 3594, 3597, 3602, 3607, 3609, 3612
3613, 3614, 3620, 3621, 3632, 3634, 3635, 3636, 3639
3641, 3649, 3654, 3664, 3667, 3679, 3680, 3683, 3692
3701, 3708, 3713, 3720, 3743, 3750, 3765, 3773, 3783
3827, 3842, 3852, 3864, 3918, 3966, 4018, 4028, 4050
4071, 4099, 4198, 4215, 4231, 4258, 4310, 4328, 4484
4489, 4493, 4519, 4526, 4538, 4544,

COLORIMETRY
3772, 3860, 3877, 3886, 3896, 3907, 4027, 4063, 4132
4300, 4351, 4389, 4429,

COLUMN CHROMATOGRAPHY
4113, 4193,

COMBUSTION PRODUCTS
3568, 3581, 3589, 3601, 3630, 3633, 3635, 3647, 3648
3649, 3653, 3654, 3657, 3661, 3662, 3666, 3672, 3673
3676, 3679, 3682, 3686, 3688, 3690, 3691, 3692, 3693
3696, 3700, 3702, 3703, 3706, 3712, 3713, 3729, 3732
3734, 3760, 3769, 3773, 3778, 3783, 3786, 3787, 3788
3793, 3794, 3795, 3807, 3817, 3820, 3824, 3830, 3844
3845, 3852, 3857, 3858, 3880, 3913, 3942, 3950, 3958
4014, 4015, 4129, 4162, 4188, 4213, 4214, 4215, 4258
4305, 4354, 4469, 4484, 4502, 4507,

CONDENSATION (ATMOSPHERIC)
3894, 3931, 3949, 3956, 4427, 4474,

CONSTRUCTION MATERIALS
3594, 3646, 3674, 3678, 3685, 3706, 3792, 4302, 4425
4541,

CONTROL AGENCIES
3925, 4512, 4514,

CONTROL PROGRAMS
3938, 4498, 4511, 4518, 4540,

CONTROLLED ATMOSPHERES
3854, 4088, 4305, 4412, 4441, 4447, 4477, 4480, 4525

COPPER COMPOUNDS
3709, 3805, 3819, 3878, 3897, 3976, 3985, 4039, 4044
4101, 4107, 4119, 4141, 4205, 4261, 4263, 4268, 4275
4305, 4306, 4330, 4343, 4353, 4359, 4392,

CORROSION
3572, 3616, 3642, 3678, 3686, 3825, 3842, 4143, 4162
4345, 4478, 4479, 4480, 4481, 4482, 4483, 4484, 4485
4486, 4487, 4488, 4490, 4492,

COSTS
3565, 3586, 3596, 3604, 3607, 3612, 3613, 3614, 3621
3623, 3628, 3658, 3679, 3685, 3692, 3694, 3702, 3710
3723, 3732, 3746, 3770, 3773, 3786, 3790, 3797, 3825
3845, 3990, 4028, 4031, 4062, 4065, 4175, 4198, 4311
4326, 4491, 4494, 4495, 4506, 4517, 4523, 4527, 4528
4531, 4535, 4537, 4538, 4542,

CROPS
4125, 4136, 4137, 4144, 4206, 4219, 4364, 4397, 4450
4455, 4456, 4457, 4460, 4470,

DATA HANDLING SYSTEMS
3718, 3887, 3955, 4096, 4112, 4159, 4164, 4282, 4311
4519,

DESIGN CRITERIA
3570, 3610, 3621, 3637, 3638, 3640, 3650, 3656, 3660
3661, 3671, 3677, 3678, 3682, 3684, 3688, 3691, 3693
3706, 3707, 3711, 3722, 3725, 3727, 3731, 3733, 3740
3752, 3761, 3766, 3768, 3788, 3798, 3801, 3804, 3813
3814, 3825, 3826, 3834, 3844, 3848, 3849, 3856, 3874
3884, 3893, 3902, 3903, 3913, 3972, 4116, 4127, 4154
4174, 4315, 4325, 4328, 4477, 4525,

DESULFURIZATION OF FUELS
3634, 3652, 3664, 3667, 3679, 3680, 3699, 3705, 3708
3717, 3720, 3731, 3744, 3749, 3750, 3759, 3761, 3765
3773, 3781, 3797, 3798, 3815, 3822, 3823, 3827, 3842
3924, 4028, 4071, 4223, 4274, 4548,

DIESEL ENGINES
3738, 4508,

DISPERSION
3570, 3581, 3734, 3825, 3950, 3955, 3958, 3960, 4228
4354, 4381, 4419, 4511, 4512,

DUST FALL
3933, 3938, 3940, 3947,

ECONOMIC LOSSES
4482, 4492, 4495, 4506,

ELECTRIC POWER PRODUCTION
3570, 3575, 3581, 3584, 3589, 3597, 3601, 3605, 3607
3608, 3612, 3613, 3628, 3632, 3643, 3653, 3692, 3732
3743, 3783, 3797, 3808, 3817, 3825, 3845, 3943, 4031
4235, 4484, 4537,

ELECTRICAL PROPERTIES
3587, 3740, 3752, 3875, 3999, 4040, 4098, 4157, 4163
4311, 4322, 4323, 4332, 4363, 4532,

ELECTROCHEMICAL METHODS
3855, 3932, 4042, 4155, 4206, 4233, 4264,

ELECTRON MICROSCOPY
4095, 4204, 4211, 4244, 4311, 4479,

ELECTROSTATIC PRECIPITATORS
3581, 3587, 3646, 3664, 3685, 3701, 3722, 3723, 3730
3734, 3739, 3740, 3752, 3777, 3779, 3790, 3802, 3808
3812, 3818, 3837, 4363,

EMISSION INVENTORIES
3574, 3943, 4511, 4512, 4514,

ENFORCEMENT PROCEDURES
4528,

EPIDEMIOLOGY
4013, 4366, 4370, 4398, 4420, 4423, 4437, 4438,

ETHYLENE
4067, 4242, 4303, 4541,

EUROPE
3570, 3574, 3580, 3581, 3583, 3587, 3588, 3589, 3590
3598, 3605, 3609, 3615, 3619, 3622, 3630, 3634, 3635
3636, 3638, 3643, 3645, 3648, 3655, 3656, 3658, 3662
3665, 3666, 3668, 3687, 3690, 3691, 3693, 3695, 3697
3700, 3703, 3705, 3710, 3713, 3714, 3721, 3722, 3724
3730, 3732, 3739, 3740, 3742, 3743, 3744, 3745, 3749
3752, 3753, 3756, 3772, 3777, 3778, 3779, 3787, 3791
3795, 3796, 3798, 3799, 3800, 3802, 3803, 3804, 3805
3809, 3810, 3811, 3812, 3816, 3821, 3822, 3823, 3828
3829, 3830, 3831, 3845, 3849, 3857, 3858, 3860, 3866
3867, 3869, 3870, 3871, 3874, 3881, 3884, 3899, 3902
3905, 3908, 3909, 3910, 3914, 3918, 3919, 3928, 3933
3939, 3942, 3943, 3946, 3947, 3960, 3963, 3965, 3966
3970, 3971, 3972, 3975, 3976, 3980, 3981, 3982, 3983
3984, 3988, 3992, 3993, 3999, 4003, 4004, 4005, 4007
4011, 4013, 4018, 4020, 4026, 4027, 4034, 4035, 4038
4039, 4041, 4042, 4043, 4044, 4050, 4051, 4052, 4054
4055, 4059, 4066, 4067, 4068, 4076, 4077, 4079, 4080
4082, 4083, 4084, 4085, 4087, 4097, 4098, 4099, 4104
4105, 4106, 4111, 4123, 4124, 4128, 4129, 4135, 4142
4145, 4146, 4147, 4148, 4149, 4154, 4162, 4165, 4166
4167, 4170, 4171, 4172, 4173, 4175, 4176, 4179, 4194
4196, 4197, 4199, 4203, 4205, 4211, 4212, 4213, 4216
4219, 4224, 4225, 4226, 4227, 4233, 4234, 4235, 4237
4239, 4240, 4248, 4255, 4260, 4262, 4263, 4266, 4273
4274, 4278, 4279, 4280, 4283, 4286, 4288, 4295, 4296

4297, 4298, 4299, 4300, 4302, 4314, 4316, 4317, 4328
4329, 4331, 4334, 4335, 4340, 4341, 4343, 4348, 4355
4359, 4362, 4367, 4370, 4371, 4376, 4377, 4384, 4388
4390, 4391, 4392, 4393, 4394, 4396, 4403, 4407, 4408
4410, 4412, 4416, 4418, 4419, 4420, 4421, 4423, 4425
4426, 4427, 4428, 4432, 4436, 4439, 4441, 4447, 4449
4457, 4459, 4464, 4465, 4466, 4467, 4469, 4474, 4475
4478, 4479, 4480, 4482, 4500, 4502, 4504, 4505, 4507
4508, 4509, 4510, 4524,

EXPOSURE METHODS
4305, 4364, 4372, 4373, 4401, 4411, 4445, 4477, 4483

EYE IRRITATION
3608, 4374, 4395, 4426, 4431,

FERTILIZER MANUFACTURING
3578, 3608, 3703, 3751, 4149, 4355,

FILTERS
3594, 3606, 3624, 3644, 3645, 3646, 3650, 3655, 3658
3663, 3669, 3697, 3698, 3699, 3706, 3710, 3723, 3727
3728, 3736, 3737, 3739, 3741, 3745, 3747, 3754, 3762
3763, 1771, 3783, 3799, 3802, 3806, 3816, 3818, 3821
3837, 3840, 3844, 3848, 3862, 3875, 3876, 3883, 3887
3914, 4063, 4305, 4311,

FLAME IONIZATION DETECTOR
3884, 3898, 4146, 4344,

FLUORINE COMPOUNDS
SEE ALSO: HALOGENATED HYDROCARBONS
3568, 3574, 3577, 3578, 3590, 3608, 3639, 3693, 3818
3860, 4036, 4277, 4367, 4376, 4378, 4379, 4380, 4399
4420, 4430, 4449, 4452, 4454, 4455, 4456, 4457, 4458
4459, 4461, 4463, 4467, 4470, 4471, 4473, 4496, 4541

FOOD AND FEED OPERATIONS
3646, 3857,

FUEL ADDITIVES
3572, 3642, 3664, 3689,

FUEL GASES
3583, 3612, 3613, 3614, 3618, 3632, 3639, 3647, 3711
3897, 3907, 4002, 4021, 4028, 4238,

FUEL OILS
3567, 3591, 3607, 3612, 3613, 3614, 3632, 3635, 3639
3682, 3731, 3735, 3773, 3924, 4143, 4162, 4223, 4481

FURNACES
3568, 3583, 3585, 3596, 3601, 3621, 3636, 3642, 3666
3682, 3686, 3696, 3740, 3766, 3779, 3807, 3812, 3836
3840, 3852, 3943, 4127, 4154, 4188, 4258, 4312, 4382
4488, 4548,

GAS CHROMATOGRAPHY
SEE ALSO: FLAME IONIZATION DETECTOR
3781, 3866, 3871, 3879, 3898, 3924, 3928, 3934, 4019
4146, 4236, 4289, 4344,

GAS SAMPLING
3578, 3585, 3854, 3870, 3872, 3874, 3877, 3880, 3902
3920, 3926, 3927, 4488,

GAS TURBINES
3719,

GASOLINES
3604, 3618, 3629, 3764, 3782, 3895,

HALOGENATED HYDROCARBONS
3921,

HEMATOLOGY
3987, 4037, 4060, 4084, 4107, 4114, 4147, 4151, 4153
4245, 4267, 4375, 4376, 4377, 4389, 4400, 4401, 4408
4411, 4412, 4413, 4414, 4422, 4429, 4433, 4441, 4458
4461, 4473,

HIGHWAYS
3573,

HYDROCHLORIC ACID
4486,

HYDROGEN SULFIDE
3619, 3637, 3652, 3657, 3711, 3732, 3736, 3753, 3791
3811, 3815, 3832, 3849, 3855, 3861, 3872, 3891, 3920
3932, 3935, 3967, 4053, 4069, 4159, 4191, 4241, 4263
4296, 4297, 4336, 4421, 4453, 4482,

INCINERATION
3630, 3655, 3686, 3688, 3728, 3777, 3824,

INVERSION
3960, 4374,

IRON COMPOUNDS
3580, 3636, 3703, 3704, 3985, 4006, 4011, 4041, 4046
4077, 4101, 4103, 4113, 4203, 4205, 4214, 4248, 4258
4261, 4268, 4270, 4274, 4280, 4312, 4340, 4341, 4342
4355, 4364, 4462, 4490,

ISOTOPES
3597, 3878, 3937, 3944, 3961, 3996, 4000, 4008, 4033
4074, 4084, 4122, 4168, 4211, 4221, 4227, 4230, 4244
4247, 4405, 4460,

KRAFT PULPING
3566, 3593, 3631, 3677, 3686, 3770, 3838, 3839, 3967
3968, 3971, 3981, 3982, 3983, 3984, 4036, 4047, 4049
4065, 4073, 4132, 4136, 4138, 4140, 4175, 4181, 4185
4186, 4190, 4216, 4304, 4346, 4347, 4350, 4488,

LABORATORY ANIMALS
3882, 3970, 3994, 3996, 4000, 4008, 4032, 4038, 4046

4066, 4074, 4087, 4100, 4114, 4120, 4121, 4141, 4145
4157, 4167, 4168, 4218, 4229, 4230, 4243, 4244, 4256
4269, 4285, 4308, 4314, 4322, 4361, 4365, 4367, 4368
4369, 4371, 4372, 4376, 4386, 4387, 4390, 4391, 4392
4393, 4395, 4397, 4400, 4401, 4405, 4406, 4407, 4410
4411, 4412, 4413, 4414, 4416, 4417, 4421, 4422, 4430
4433, 4440, 4441, 4447, 4454, 4455, 4461, 4473, 4525

LASERS
3916, 3923,

LEAD COMPOUNDS
3573, 3576, 3585, 3868, 3905, 3921, 3926, 3975, 4029
4039, 4044, 4177, 4205, 4227, 4275, 4279, 4330, 4375
4385, 4386, 4459, 4468,

LEGAL ASPECTS
3605, 3630, 3655, 3667, 3689, 3724, 3757, 3821, 3899
4498, 4500, 4502, 4504, 4505, 4507, 4508, 4509, 4510
4511, 4512, 4513, 4516, 4528, 4530,

LIGHT RADIATION
3906, 3952, 3954, 4075, 4080, 4122,

LIGHT SCATTERING
3850, 3923, 3951, 3952, 3954, 4011,

MANGANESE COMPOUNDS
3661, 3753, 3754, 3767, 3878, 3922, 3969, 3976, 3985
3987, 3992, 3994, 3995, 3996, 4000, 4008, 4011, 4023
4024, 4032, 4033, 4037, 4044, 4045, 4046, 4063, 4074
4075, 4080, 4087, 4091, 4101, 4103, 4105, 4107, 4113
4119, 4121, 4125, 4130, 4133, 4141, 4151, 4156, 4157
4165, 4166, 4173, 4178, 4187, 4189, 4192, 4193, 4202
4204, 4205, 4206, 4220, 4222, 4229, 4230, 4244, 4259
4261, 4263, 4268, 4285, 4308, 4309, 4313, 4314, 4319
4322, 4330, 4335, 4343, 4351, 4353, 4358, 4359, 4361
4382, 4408, 4416,

MATHEMATICAL ANALYSES
SEE ALSO: MATHEMATICAL MODELING
3622, 3634, 3645, 3737, 3740, 3748, 3900, 3914, 3949
3950, 3952, 3954, 3955, 3959, 3960, 3966, 3997, 4002
4003, 4009, 4012, 4018, 4050, 4051, 4064, 4088, 4096
4098, 4107, 4112, 4116, 4129, 4154, 4159, 4161, 4164
4167, 4177, 4179, 4190, 4238, 4247, 4255, 4258, 4262
4272, 4283, 4288, 4303, 4307, 4311, 4315, 4331, 4332
4354, 4360, 4363, 4493, 4531,

MATHEMATICAL MODELING
3949, 3952, 3954, 3955, 3959, 3966, 4085, 4112, 4182
4238, 4303, 4390,

MAXIMUM ALLOWABLE CONCENTRATION
3609, 4167, 4371, 4400, 4401, 4411, 4412, 4419, 4422
4430, 4432, 4440, 4441, 4447, 4507,

MERCURY COMPOUNDS
3885, 3921, 4141, 4147, 4155, 4369,

METAL COMPOUNDS
SEE ALSO: SPECIFIC METAL COMPOUNDS
3573, 3576, 3580, 3582, 3585, 3588, 3597, 3624, 3628
3633, 3649, 3657, 3661, 3663, 3683, 3690, 3704, 3709
3711, 3731, 3753, 3754, 3759, 3767, 3775, 3781, 3784
3798, 3819, 3828, 3829, 3851, 3855, 3860, 3878, 3887
3897, 3905, 3922, 3944, 3951, 3963, 3968, 3969, 3975
3976, 3977, 3978, 3982, 3985, 3987, 3992, 3994, 3995
3996, 4000, 4006, 4007, 4008, 4011, 4016, 4017, 4023
4024, 4026, 4029, 4032, 4033, 4034, 4037, 4038, 4039
4044, 4045, 4046, 4052, 4054, 4063, 4072, 4073, 4074
4076, 4079, 4080, 4083, 4087, 4091, 4101, 4103, 4105
4107, 4108, 4110, 4113, 4118, 4119, 4121, 4125, 4130
4133, 4136, 4137, 4141, 4142, 4147, 4149, 4150, 4151
4155, 4156, 4157, 4177, 4178, 4179, 4187, 4189, 4190
4192, 4193, 4196, 4202, 4204, 4205, 4206, 4207, 4210
4214, 4220, 4221, 4222, 4229, 4230, 4234, 4235, 4244
4249, 4253, 4257, 4258, 4261, 4263, 4268, 4275, 4284
4285, 4291, 4299, 4302, 4306, 4308, 4309, 4312, 4313
4314, 4319, 4321, 4322, 4324, 4325, 4330, 4332, 4341
4342, 4343, 4349, 4353, 4358, 4359, 4361, 4362, 4368
4369, 4375, 4385, 4386, 4388, 4402, 4407, 4449, 4459
4460, 4462,

METALS
SEE ALSO: METAL COMPOUNDS AND SPECIFIC METAL COMPOUNDS
3568, 3574, 3576, 3585, 3610, 3616, 3624, 3636, 3646
3693, 3734, 3766, 3779, 3805, 3812, 3835, 3859, 3865
3887, 3977, 3985, 3992, 4004, 4041, 4042, 4048, 4051
4057, 4109, 4129, 4160, 4161, 4162, 4169, 4242, 4263
4276, 4292, 4293, 4325, 4326, 4338, 4344, 4357, 4365
4367, 4371, 4376, 4382, 4436, 4444, 4460, 4467, 4472
4478, 4479, 4480, 4481, 4482, 4483, 4484, 4485, 4486
4487, 4488, 4490, 4541,

METHANES
3861, 3864, 3934, 3966, 4028, 4260, 4287, 4303, 4541

MICROORGANISMS
3816, 3879, 3945, 3978, 3995, 4023, 4057, 4075, 4103
4133, 4156, 4202, 4204, 4228, 4246, 4250, 4252, 4313
4314, 4319, 4353, 4358, 4372, 4397, 4403, 4418, 4547

MINERAL PROCESSING
3579, 3582, 3584, 3585, 3594, 3597, 3603, 3606, 3622
3641, 3646, 3685, 3745, 3864, 3888, 3903, 3964, 4394
4399, 4415, 4425, 4538, 4548,

MINERAL PRODUCTS
SEE ALSO: ASBESTOS
3603, 3606, 3608, 3649, 3674, 3793, 3825, 3918, 4073
4183, 4207, 4209, 4266, 4293, 4316, 4345, 4402, 4403

MONITORING
3573, 3578, 3850, 3861, 3863, 3864, 3868, 3874, 3882
3883, 3888, 3890, 3901, 3910, 3913, 3920, 3933, 3942
3944, 3954, 3957, 4016, 4496, 4514, 4516,

NICKEL COMPOUNDS
3625, 3759, 4046, 4113, 4141, 4222, 4275, 4329,

NITRATES
3598, 3639, 3964, 4072, 4177, 4432, 4477, 4541,

NITROGEN OXIDES
3565, 3571, 3587, 3611, 3629, 3633, 3639, 3647, 3648
3668, 3676, 3681, 3694, 3703, 3709, 3721, 3729, 3738
3756, 3789, 3793, 3801, 3803, 3818, 3820, 3831, 3858
3861, 3877, 3880, 3891, 3957, 3964, 3965, 3973, 3979
3980, 3986, 4007, 4020, 4022, 4030, 4053, 4054, 4068
4070, 4076, 4077, 4079, 4088, 4094, 4102, 4122, 4126
4149, 4173, 4196, 4197, 4205, 4217, 4241, 4248, 4260
4262, 4266, 4273, 4282, 4288, 4294, 4305, 4317, 4334
4372, 4375, 4389, 4516, 4541,

ODORIMETRY
3889, 3901, 3917, 3928, 4289, 4321, 4411, 4440,

OUORS
3596, 3646, 3677, 3777, 3879, 3891, 3898, 3901, 3928
3936, 4186, 4411, 4430, 4440, 4441, 4447,

OPEN BURNING
3956,

ORGANIC NITROGEN COMPOUNDS
3653, 3731, 3898, 3907, 3912, 4001, 4034, 4210, 4255
4412, 4433,

ORGANIC SULFUR COMPOUNDS
3619, 3731, 3784, 3872, 3920, 3967, 4069, 4155, 4186
4397, 4421,

OXIDANTS
4129, 4477, 4541, 4546,

OZONE
3639, 3815, 3930, 3935, 3948, 3954, 3957, 3959, 4126
4164, 4255, 4386, 4418, 4448, 4450, 4477, 4541, 4546

PAPER CHROMATOGRAPHY
3995, 4133, 4158, 4291, 4335,

PARTICLE COUNTERS
3869, 3881, 3883, 3892, 3893, 3903, 3916, 3918,

PARTICLE SIZE
3573, 3740, 3821, 3863, 3881, 3892, 3900, 3903, 3904
3908, 3916, 3918, 4012, 4182, 4315, 4348, 4384, 4405
4532,

PARTICULATE SAMPLING
3852, 3862, 3868, 3869, 3888, 3904, 3908, 3918, 3931
3935, 3944, 3945, 4228, 4307, 4315, 4434,

PARTICULATES
SEE ALSO: PULLENS AND SMOG
3566, 3568, 3573, 3576, 3581, 3585, 3594, 3596, 3603
3605, 3606, 3617, 3620, 3621, 3622, 3624, 3626, 3630
3634, 3636, 3646, 3649, 3650, 3654, 3655, 3658, 3659
3666, 3669, 3671, 3682, 3685, 3693, 3698, 3701, 3705
3708, 3713, 3722, 3723, 3724, 3727, 3729, 3730, 3734
3736, 3737, 3739, 3740, 3741, 3745, 3747, 3748, 3752
3755, 3770, 3771, 3777, 3779, 3783, 3785, 3788, 3793
3799, 3802, 3806, 3807, 3808, 3812, 3814, 3816, 3821
3824, 3825, 3836, 3838, 3840, 3841, 3846, 3848, 3850
3851, 3852, 3857, 3862, 3863, 3865, 3867, 3868, 3869
3876, 3881, 3882, 3883, 3887, 3888, 3900, 3903, 3904
3908, 3909, 3912, 3914, 3916, 3918, 3922, 3923, 3931
3933, 3935, 3936, 3940, 3941, 3947, 3950, 3955, 3956
3957, 4009, 4012, 4062, 4086, 4120, 4127, 4246, 4307
4315, 4320, 4343, 4348, 4363, 4364, 4368, 4371, 4373
4382, 4384, 4385, 4387, 4388, 4394, 4396, 4399, 4402
4405, 4415, 4416, 4419, 4422, 4425, 4427, 4434, 4435
4456, 4458, 4462, 4463, 4469, 4474, 4483, 4496, 4507
4511, 4512, 4513, 4516, 4523, 4532, 4534, 4541, 4543

PESTICIDES
4383, 4416, 4442,

PETROLEUM REFINING
3572, 3608,

PHOSPHORUS COMPOUNDS
3578, 3590, 3683, 3852, 3975, 3976, 4032, 4221, 4222
4268, 4277,

PHOTOCHEMICAL REACTIONS
3611, 3855, 4078, 4122, 4187, 4242,

PHOTOMETRIC METHODS
3587, 3874, 3885, 3888, 3920, 4147,

PLANS AND PROGRAMS
SEE ALSO: AREA SURVEYS AND CONTROL PROGRAMS
3573, 3612, 3613, 3670, 3936, 3938, 3946, 4423, 4498
4501, 4503, 4515, 4540,

PLASTICS
3776, 3792, 3927,

PNEUMOCONIOSIS
SEE ALSO: RESPIRATORY DISEASES AND BRONCHITIS
3603, 3869, 4385, 4394, 4415, 4438, 4469,

POLLENS
3841, 4086, 4434,

POLYNUCLEAR COMPOUNDS
SEE ALSO: PYRENES AND BENZOPYRENES
3867, 4257, 4389,

PRECIPITATION
3894, 3910, 3931, 3937, 3961, 4318, 4460, 4462,

PULMONARY FUNCTION
SEE ALSO: RESPIRATORY FUNCTIONS
4081, 4368, 4373, 4381, 4399, 4413, 4435, 4439, 4445

PYRENES
SEE ALSO: BENZOPYRENES
3867,

RADIOACTIVE RADIATION
3865, 3870, 3882, 3883, 3887, 3910, 3914, 3915, 3937
3944, 3960, 3989, 4046, 4050, 4107, 4242, 4244, 4364
4365, 4369, 4405, 4460, 4532, 4534,

REACTION KINETICS
3587, 3642, 3703, 3759, 3775, 3825, 3829, 3977, 3979
3980, 3988, 4004, 4007, 4018, 4020, 4022, 4026, 4030
4060, 4064, 4067, 4072, 4076, 4077, 4085, 4086, 4089
4090, 4102, 4112, 4114, 4116, 4122, 4126, 4148, 4161
4179, 4186, 4187, 4189, 4191, 4192, 4193, 4197, 4202
4212, 4217, 4218, 4220, 4221, 4222, 4223, 4226, 4240
4241, 4242, 4247, 4255, 4262, 4265, 4267, 4270, 4273
4282, 4286, 4296, 4299, 4302, 4309, 4312, 4313, 4329
4331, 4334, 4338, 4342, 4344, 4346, 4350, 4358, 4362

REACTION MECHANISMS
3617, 3653, 3717, 3759, 3825, 3973, 4001, 4024, 4032
4040, 4053, 4068, 4069, 4072, 4079, 4083, 4102, 4116
4118, 4122, 4124, 4155, 4162, 4179, 4191, 4192, 4218
4220, 4224, 4227, 4241, 4242, 4245, 4255, 4272, 4273
4287, 4295, 4297, 4298, 4299, 4317, 4331, 4479, 4485
4487,

RESEARCH PROGRAMS
3581, 3680, 3750, 4497, 4500, 4528, 4529, 4540,

RESPIRATORY DISEASES
SEE ALSO: BRONCHITIS AND PNEUMOCONIOSIS
3869, 4013, 4081, 4086, 4201, 4256, 4366, 4370, 4371
4372, 4374, 4385, 4389, 4393, 4394, 4398, 4404, 4406
4407, 4408, 4409, 4413, 4415, 4435, 4442, 4453, 4505
4516,

RESPIRATORY FUNCTIONS
SEE ALSO: PULMONARY FUNCTION
3649, 3683, 3918, 3950, 4081, 4135, 4147, 4364, 4368
4369, 4370, 4372, 4373, 4381, 4384, 4388, 4399, 4404
4405 4406, 4413, 4417, 4424, 4425, 4435,

RESPIRATORY SYSTEM
3882, 4081, 4120, 4135, 4147, 4201, 4256, 4269, 4285
4352, 4364, 4368, 4369, 4372, 4381, 4384, 4385, 4388
4397, 4399, 4400, 4406, 4415, 4425, 4428, 4432, 4435
4438, 4445, 4464,

SAMPLERS
SEE ALSO: SOURCE SAMPLING
3682, 3728, 3804, 3855, 3857, 3862, 3865, 3888, 3891
3904, 3908, 3913, 3929, 3933, 3935, 3957, 4195, 4228
4434,

SCRUBBERS
3566, 3568, 3594, 3601, 3606, 3644, 3653, 3657, 3664
3668, 3686, 3691, 3693, 3702, 3723, 3728, 3734, 3739
3745, 3747, 3754, 3770, 3774, 3776, 3779, 3788, 3792
3793, 3795, 3800, 3802, 3807, 3812, 3818, 3824, 3825
3836, 3837, 3838, 3839, 3844, 3848, 3997, 4149, 4232
4266, 4543,

SELENIUM COMPOUNDS
3625, 4046,

SIMULATION
3748, 4425,

SKIN
3574, 4045, 4194, 4361, 4396, 4410, 4436, 4438, 4458

SMOG
3906, 4431,

SOLVENTS
3714, 3764, 3828, 3899, 3919, 4242, 4275, 4395,

SOURCE SAMPLING
SEE ALSO: SAMPLERS
3701, 3870, 4502,

SO2 REMOVAL (COMBUSTION PRODUCTS)
3624, 3642, 3649, 3653, 3654, 3660, 3661, 3663, 3664
3665, 3672, 3673, 3675, 3679, 3690, 3691, 3692, 3694
3696, 3700, 3702, 3712, 3732, 3735, 3742, 3743, 3751
3753, 3754, 3766, 3767, 3786, 3787, 3791, 3794, 3802
3809, 3810, 3811, 3825, 3829, 3832, 3833, 3835, 3845
3929, 3997, 4014, 4015, 4017, 4026, 4094, 4115, 4183
4226, 4235, 4292, 4293, 4295, 4296, 4336, 4545,

SPARK IGNITION ENGINES
3565, 3707, 3895, 4508,

SPECTROMETRY
3861, 3865, 3867, 3879, 3885, 3887, 3913, 3957, 4003
4040, 4048, 4061, 4107, 4109, 4119, 4139, 4146, 4150
4158, 4220, 4221, 4225, 4242, 4261, 4285, 4287, 4315
4353, 4405,

SPECTROPHOTOMETRY
3615, 3728, 3851, 3859, 3995, 4016, 4030, 4052, 4089
4095, 4101, 4108, 4113, 4156, 4164, 4184, 4189, 4222
4253, 4257, 4275, 4276, 4330, 4357,

STREETS
3763, 3890, 3939,

SULFUR COMPOUNDS
SEE ALSO: HYDROGEN SULFIDE
3576, 3582, 3589, 3602, 3619, 3631, 3637, 3652, 3653
3657, 3683, 3703, 3704, 3711, 3732, 3751, 3753, 3754
3765, 3784, 3794, 3805, 3811, 3832, 3852, 3855, 3872
3885, 3889, 3891, 3898, 3920, 3924, 3932, 3935, 3962
3967, 3968, 3977, 4015, 4019, 4053, 4069, 4073, 4077
4082, 4121, 4123, 4124, 4142, 4145, 4148, 4159, 4176
4186, 4191, 4198, 4208, 4227, 4234, 4241, 4242, 4254

4263, 4268, 4270, 4277, 4279, 4280, 4296, 4297, 4305
4312, 4317, 4324, 4336, 4342, 4346, 4355, 4390, 4392
4396, 4421, 4453, 4482, 4483, 4489, 4507, 4541, 4545
4548,

SULFUR OXIDES
3566, 3579, 3581, 3589, 3591, 3605, 3637, 3639, 3642
3652, 3653, 3654, 3661, 3665, 3679, 3691, 3692, 3696
3702, 3734, 3736, 3743, 3747, 3751, 3767, 3793, 3796
3809, 3810, 3811, 3818, 3835, 3847, 3856, 3877, 3885
3891, 3913, 3920, 3929, 3932, 3935, 3938, 3940, 3942
3953, 3958, 3962, 3963, 3992, 3993, 3997, 4003, 4005
4014, 4015, 4039, 4040, 4041, 4042, 4043, 4056, 4067
4083, 4090, 4093, 4094, 4115, 4122, 4142, 4148, 4159
4160, 4161, 4170, 4172, 4174, 4179, 4180, 4188, 4191
4203, 4208, 4209, 4212, 4213, 4227, 4234, 4235, 4240
4247, 4260, 4263, 4270, 4271, 4280, 4294, 4296, 4298
4299, 4302, 4305, 4312, 4317, 4324, 4331, 4336, 4338
4342, 4345, 4355, 4362, 4366, 4373, 4389, 4398, 4406
4409, 4413, 4445, 4448, 4450, 4457, 4459, 4466, 4469
4475, 4478, 4479, 4481, 4483, 4484, 4487, 4489, 4490
4507, 4511, 4512, 4516, 4541,

SYNERGISM
4373, 4411, 4440, 4450, 4546,

TESTING FACILITIES
3782, 3852, 3915, 3918, 4093, 4369, 4443, 4525, 4547

TEXTILES
3619,

THERMODYNAMICS
3617, 3871, 3929, 3993, 4003, 4009, 4029, 4039, 4054
4056, 4083, 4089, 4093, 4094, 4106, 4111, 4115, 4118
4129, 4136, 4150, 4159, 4160, 4170, 4171, 4172, 4197
4203, 4209, 4212, 4213, 4231, 4235, 4237, 4245, 4248
4263, 4270, 4271, 4280, 4282, 4284, 4288, 4294, 4334
4340, 4362,

THRESHOLDS
4395, 4401, 4411, 4430, 4432, 4437, 4440, 4441, 4447
4546,

TOPOGRAPHIC INTERACTIONS
3955, 3957,

TOXICITY
3577, 3921, 3970, 4037, 4145, 4167, 4285, 4314, 4371
4376, 4380, 4383, 4386, 4387, 4389, 4391, 4392, 4400
4407, 4410, 4411, 4412, 4422, 4430, 4433, 4440, 4441
4447, 4455, 4456, 4467, 4468, 4473, 4477, 4546,

TRANSPORTATION
SEE ALSO: AIRCRAFT, GAS TURBINES, DIESEL ENGINES, SPARK IGNITION ENGINES, VEHICLES
3565, 3569, 3573, 3592, 3618, 3623, 3639, 3687, 3689
3695, 3707, 3709, 3719, 3726, 3762, 3768, 3782, 3843
3895, 4238, 4332, 4383, 4508, 4541, 4547,

TREES
3578, 3922, 3956, 3998, 4285, 4330, 4356, 4367, 4460
4466, 4467, 4477,

URBAN AREAS
3573, 3850, 3939, 3941, 3943, 3947, 4384, 4399, 4426
4458, 4463, 4465, 4475, 4495, 4499, 4505, 4511, 4512
4514, 4516, 4522, 4530,

VANADIUM COMPOUNDS
3886, 3963, 3975, 4041, 4090, 4179, 4205, 4212, 4299
4308, 4324, 4422,

VEGETABLES
3969, 4095, 4285, 4330, 4367, 4460, 4467, 4470,

VEHICLES
3565, 3573, 3592, 3605, 3618, 3623, 3639, 3768, 3782
3843, 3890, 3895, 4541,

VISIBILITY
3923,

ZINC COMPOUNDS
3579, 3582, 3624, 3851, 3878, 3978, 4029, 4039, 4046

AUTHOR INDEX

This index lists individual authors with a maximum of 5 per abstract. No distinction is given between senior and other authors. The authors are cited by (NAB) number only.

Preceding page blank

AUTHOR INDEX

A

AARVIK J 03962
ABE S 04075
ABE, S 04320
ACHENBACH K 03798
ADADUROV I Y 03963
ADAMS, D F 03855
ADDISON W E 03964
ADDISON W E 03986
ADRUSSOW L 03965
AGUILLARDO D 04141
AHLQUIST, N C 03850
AIKEN W H 04521
AIREY E M 03966
AKAMATSU, I 03967
AKASHI S 03617
ALARY, J 03860
ALBERS A 04279
ALBERT, R E 04364
ALDRICH L C 03968
ALEKSANDROV V P 03722
ALFANO G 03645
ALLAN, R E 03851
ALLCROFT R 04449
ALLFREY V G 04243
ALLFREY V G 04244
ALTHAUS H 03795
AMIN J V 04125
AMOS S 03987
AMT U 04384
AMUSO S J 04444
ANAVI Z 03885
ANBAR M 04365
ANDERSON H C 03647
ANDERSON C B 04254
ANDERSON J M 03969
ANDREEVA N B 04392
ANIOL S 03789
ANISIMOV B V 03970
ANNERGREN G 03972
ANNERGREN G 03971
ANTIPIN V G 03636
APPLEBAUM D 03973
APPLEGATE H G 04450
APRISON M H 04101
ARAKAWA Y 03974
ARATEN D 03975
ARNIKAR, H J 03853
ARONOVITCH M 04406
ARTAMONOV V S 03976
ARVIA A J 04332
ARVIA A J 03977
ASBELL M A 03978
ASHMORE P G 03979
ASKANAZY, M 04451
ATROSHCHENKO V I 03980
ATROSHCHENKO V I 03648
ATTIG R C 03649
AURELL R 03983
AURELL R 03982
AURELL R 03981
AURELL, R 03984
AVETISYAN A S 04162
AYERS, R U 03565
AYNARD A 03635
AYRES S M 04366

B

BACKLUND A 03972
BACKLUND A 03971
BAGOTZKY V S 04098
BAGYAN, R G 04394
BAILEY, R L 03854
BAILLEUL M 03700
BAKALINSKAYA E D 04371
BAKKEN, J F 03637
BALAREW C 04196
BALASSA J J 04285
BALAZOVA G 04367
BALLARD, H N 03948
BAMESBERGER, W L 03855
BANDYOPADHYAY P K 03877
BARCK H 04205
BARCLAY H G 03651
BARDELLI, P 04452
BARKER M E 03985
BARKER W V 03625
BARONI A 03619
BARRER R M 03964
BARRER R M 03986
BARRICK E R 04037
BARROW E M 03987
BARTON K 04478
BARTONOVA Z 04478
BASEVICH V Y 03988
BASTIAN, R E 04498
BATCHELOR J D 03652
BATE L C 03989
BAXTER, W A 03654
BEAUJEAN J 03990
BECK H 03655
BECKER G 04479
BECKMANN R B 04090
BEEBE R A 04115
BEELIK A 03991
BEILIN, H 04368
BEL CHINA L A 03703
BELCHER, R 03992
BENJAMIN, M 03566
BENLINE, A J 04522
BENNETT A E 04404
BENNETT C F 03868
BENNETT E T 03856

BENTELER E C3656
BERGHOLM C A 03657
BERGMANN L 03658
BERING B P 03993
BERLIN, M H 04369
BERNARD, C 03994
BERNERT, J 03857
BERRY S A 03995
BERRY, E X 03949
BERTINCHAMPS A J 03996
BETHELL K D 03858
BETHUNE, W J 03659
BETTA V 03645
BETTLE, J F 03948
BEUSCHLEIN W L 03997
BEVER M B 04284
BEYTIA, E 03998
BIENSTOCK D 03661
BIENSTOCK D C3660
BILLARD F 03999
BIRNIE G D 04000
BISCHOFF K B 04112
BISHOP N I 04187
BISTRON S 03789
BITTENBENDER J B 04444
BLACKMORE W M 04525
BLADE, O C 03567
BLAGOVA T A 04162
BLANDER M 04177
BLASER, E 04453
BLISS, A H 04499
BODENHEIMER V B 03990
BOEHLEN, B 03568
BOGATENKOV V F 03636
BOGDANOV E A 04266
BOGDANOVIC, S B 04473
BOJADZIEV L 04196
BOKOWSKI, D L 03859
BOLKER H I C4001
BONAVIDA B 04431
BONDARENKO V V 03662
BONNELL J M 04002
BOOTER R 04003
BORG D C 04033
BORIO R W 03842
BORONIN V S 04004
BOSSHARD E 04005
BOSSHART R E 04063
BOUDIK F 04370
BOUQUIAUX J 04500
BOURBON, P 03860
BOVEE, H H 03861
BOVING J O 03663
BOWMAN C T 04287
BOYCHENKO Y A 04335
BOYLE, M 04523
BRAKHNOVA I T 04371
BRALLIER P S 04006
BRAND E H 04360
BRANDT G 04360
BRANTLEY F E 04180
BRANTNER H 04420
BRAUMAN J I 04089
BRAUNSTEIN J 04177
BRCIC B S 04007
BRENNAN P J 03664
BRETSCHNEIDER G 03798
BREYSSE, P A 03861
BRICARD J 03999
BRINK J A JR 03862
BRINK M F 04308
BRITTON A A 04008
BROCK J R 04009
BROOKS D L 04501
BROOKS R D 04010
BROWN A P 04011
BROWN K J 03595
BROWN P M 03863
BROWN T L 04150
BRUN M 04524
BRYAN R J 04525
BUCHACHENKO A L 04255
BUCKLEY R D 04372
BUDZAK, P M 03864
BULICKA M 03665
BULINA V 03666
BURCHARDT T 04068
BURGMANN G 04480
BURLEY, D R 03906
BURNETT B B 04036
BURNS K N 04449
BURSON J H III 04012
BURTON G G 04373
BUSH, R I 03667
BUTOW R A 04309
BUTURLIN V V 04013
BYLOV V D 03668
BYRNE J 03604

C

CABANE M 03999
CADDICK A J 04014
CADDICK A J 04015
CALANDRA A J 03977
CAMACHO T F 04016
CAMBEL, A B 03569
CAMERON F K 04017
CAMERON T L 03669
CAMPBELL J N 03995
CAMPBELL, H J JR 03670
CANJAR L N 04090
CARABOGDAN I 04018
CARES, J W 03865
CARLSON, J W 04491
CARNUTH W 03910
CARSEY, E A 03671
CARSON, J F 04019
CARTER C 03570
CASSELL E J 04374
CASTELLO G 03866

CAUDLE P G 04020
CAVANAGH, L A 03934
CESCOTTI R 04021
CHAIGNEAU M 03867
CHAIKIVSKY M 04481
CHAMBERLAIN C T 04526
CHAMBERS F S JR 04022
CHANCE B 04189
CHANDLER J M 03571
CHAPIN J H 04127
CHARLSON, R J 03850
CHASEN B L 04257
CHENIAE G M 04024
CHENIAE G M 04023
CHENOWETH M B 04025
CHERTKOV B A 04026
CHESLUK R P 03572
CHESTERS, G 04460
CHIKHACHEV V A 04340
CHILDERS E 03676
CHIPMAN J 04312
CHISHOLM J A 03889
CHOLAK, J 03573
CHOVIN, P 04375
CHOW T J 03868
CHRISTOFFERSON K 04027
CHROMY G 04128
CHUCHMAREV S K 04329
CHUIKOVA T A 04162
CLANCEY J T 04028
CLARK J C 04084
CLARY R 04228
CLEMENT, J L 03677
CLEMENTS, P 03678
CLERK J 04527
CLEVELAND S T 04029
CLOUGH P N 04030
COBURN R F 04414
COCHRAN D G 04193
COCHRAN N P 03680
COCK, W H 03935
COHEN P 04258
COHN J G E 03681
COHN M 04220
COLEMAN H J 03924
COLLART C 04500
COLLISON H A 04267
COLLISON H A 04060
COLOMBINI M 04376
COLOMBINI M 03574
CONCA R J 03991
CONKLIN E R 04031
CONKLIN E R 03575
CONNELLY J L 04032
COOLBAUGH W E 03576
COOPER P W 03682
COPPOLINO, J B 04477
CORI, O 03998
CORN M 04373
COTZIAS G C 03996
COTZIAS G C 04033
COTZIAS G C 04230
COTZIAS G C 04008
COUDRAY P 04377
COWELL, G W 03906
CRANE, W M 03683
CRASTE, C 03577
CRASTE, C 04379
CRASTE, C 04378
CRENTZ W L 04071
CRISTIANI, H 04380
CRISTIANI, H 04455
CRISTIANI, H 04454
CRISTIANI, H 04456
CRITCHLOW A 03869
CROCKER, B B 03606
CRONE H D 04034
CROON I 04035
CROSBY H J 04126
CROSS F L JR 03578
CROWELL E P 04036
CULKOWSKI W M 03950
CUNNINGHAM G H 03579
CUNNINGHAM A R 03604
CUNNINGHAM G N 04037
CURRAN G P 03652
CURTIS P J 04038

D

DAHL J B 03870
DAHM H P 03580
DAIGH, H D 03684
DALESKI, E J JR 04350
DALY W J 04381
DANIELS F 04070
DANILOVA Y I 04039
DAS MAHANT S 04040
DASHEVSKIY L N 04129
DASHTOYAN, A K 04394
DAVEY T 04528
DAVIDSON J K 04415
DAVIS G G 04382
DAVIS, D 04477
DAVMYAN O K 04226
DAVTYAN O K 04042
DAVTYAN O K 04331
DAVTYAN O K 04043
DAVTYAN O K 04041
DAWSON J B 04044
DE CORMIS L 04457
DE GARRETA A C 04084
DEBRUN, G 03581
DECKER R H 04045
DECKER W J 04046
DEDLOW R P 03685
DEELEY J E 03686
DEMYANOVSKAYA N S 04165
DEMYANOVSKAYA N S 04166
DENBIGH K G 04020
DEPELCHIN, A 04468

DERIVAUX, J 04468
DEVONES K R 04047
DHINGRA D 04479
DIANA L 03619
DICKEN C H 04045
DILLE, J R 04383
DINNIN J I 04048
DIRKES W E 04503
DIYEV N P 04227
DMITRIEV M T 03871
DOBCNIK D 04007
DOPFER, P 03874
DOUGLASS, I B 03566
DRAGER O H 03872
DRAKE G A 04074
DREW J 04049
DRONOV I S 04401
DRUMMOND, D 04477
DUBININ M M 04050
DUELL M G 04051
DUFAY, J 04052
DUMARCHEY G 03635
DUNN A L 04107
DUNNICLIFF H B 04053
DURAU F 04054
DURRANT L C 04450
DURRANT T 03687
DVIRKA M 03688
DYMOND, J L 03689
DZIS KO V A 04055

E

EAGON R G 03978
EARL J L 03868
EASTMAN, E D 04056
EDDINGER R T 03594
EDSALL M S 04494
EDWARDS R H T 04084
EHRENBERG W 03690
EHRLICH H L 04057
EHRLICH, C 04458
EINBRODT H J 04385
EINBRODT H J 04403
EINBRODT H J 04402
EINBRODT H J 04384
EISENBRAUN E W 04058
ELIASSON E 04059
ELLIOTT A 04404
ELLIOTT J F E 04482
ELLIOTT, J S 03677
ELLIS C W 03676
ELLIS D J 04044
EMI H 03846
EMICKE K 03691
ENGEL R R 04060
ENGEL, C R 03912
ENSER M 04066
EPSTEIN S S 04387
ERGA O 03693
ERHARDT, C L 04398
ERHARDT, W H 04460
ERMAN W F 04061
ERMENC E D 03694
ESAKI H 04446
ESCOBAR S 04339
ESTER W 03803
ESTRIDGE N K 04546
EVENSHTEYN Z M 04388
EYRE R E 03582

F

FABER J H 04062
FARBER E M 04361
FAYN F S 04166
FAYN F S 04165
FELDMAN F J 04063
FELDSTEIN M 04389
FELIX R 04504
FENDELL F E 04064
FENNELL F L 04065
FERNANDO J 04066
FERRAND, E 04530
FERRANDO R 04459
FERRARI G 03695
FEUSTEL K 03696
FIELD J H 03661
FIELD J H 03660
FIELD, F 04398
FILOV V A 04390
FINE M M 04548
FINZE W 03749
FISCHER G 04420
FISCHER H C 04207
FISCHER H 04067
FISHER G H 04531
FISHER T R 04206
FISHER, E M R 03887
FIUME L 04314
FLACH M 04391
FLACHSBART H 04315
FLOCKENHAUS C 03583
FLORY R H 03698
FOERSTER F 04068
FOGELBERG B C 04124
FOLKINS, H O 04069
FONTEIN F J 03699
FOORD, L J 03659
FORSEY, R R 03873
FORSS K 04124
FORWERG, W 03874
FOSTER E G 04070
FOUTS P G 03801
FOX S M 04000
FRANCIS, C W 04460
FRANCOIS R C 03700
FRANK R 04445
FRANKS A G 04482
FRANTZ, R L 03584
FRASER T 04071
FRAZIER J H 03701

FREDERICK, E R 03875
FREEMAN E S 04072
FREIGANG B 04391
FREITS G S 04039
FREMER K E 04124
FRICKE E 04068
FRIEDLAND, A L 03670
FRUCHTMAN I 04303
FUCHS N A 04532
FUDANO, S 04208
FUKUMA S 03702
FULLER F T 03585
FULLER R R 04073
FURCHNER J E 04074
FURUYA A 04075
FUSE Y 03738
FUWA K 04113
FUWA K 04119

G

GADASKINA I D 04392
GALAND, G 04157
GALBA J 04341
GALEANO, S F 03936
GALKINA K A 04393
GALLAGHER J T 03586
GANZ S N 03703
GANZ S N 04076
GANZ S N 04077
GARDINER W C JR 04265
GARGOUIL, Y M 04157
GARGOUIL, Y M 03994
GARIBYAN T A 04078
GAULT, W A 03951
GAUTIER, R 04380
GAUTIER, R 04455
GAUTIER, R 04456
GAUVIN W H 03746
GAVRILOV A A 03705
GAZIVODA V 04505
GEE J B L 04373
GEHLEN H 04079
GERHARDT B 04080
GERSCHMANN, R 04461
GEVORKYAN, S A 04394
GIAMMONA S T J 04081
GIBBS, W J 03937
GIEBENHAIN H 04172
GIEBENHAIN H 04170
GIERER J 04082
GIESELER G A 03706
GILFILLAN S C 04533
GINSTLING A M 04083
GIRY L 03867
GLASS H I 04084
GLAVACHEK V 04085
GLAZE W H 03879
GLAZER, I 04086
GLEBOV R N 04087
GLENN R A 03797
GLICK H S 04088
GOEBEL E 04212
GOFMAN M S 03634
GOLDBERG L 04429
GOLDEN D M 04089
GOLDMAN M 04090
GOLDSCHMID O 04251
GOLIC L 04007
GOLLER, E S 03707
GOLOVINA A I 04401
GOLUBEV A A 04395
GORDON J 04091
GORDON, J I 03952
GORIN E 03652
GOTZ H 04396
GRAFF R A 03832
GRAHAM J B 03987
GRANDJEAN J 04500
GRANT J 04092
GRASSO C 03939
GRAVEL J J O 03651
GRAY T A 03913
GRAY W A 04526
GREATHOUSE L 04351
GREBENSKOVA M D 04401
GRECO J 03790
GREEN W J 03647
GREEN, G M 04397
GREENBURG, L 04398
GREENING, P D 03762
GREGG S J 04094
GREGG S J 04093
GREGG S J 04534
GRIFFING, M E 03709
GRILLOT R 03710
GRISHKO, F I 04145
GROSS E L 04095
GROSSE R N 04506
GROVER S S 04096
GRUBNER O 04097
GRUENER P 03876
GRUSON G 03587
GUDJONSSON, S V 04399
GUERRIERI S A 03711
GUIDE, R G 03631
GUPTA S K 03877
GUREVICH I G 04098
GUSEV M I 04401
GUSEV M I 04400
GUYOT G 03700

H

HAESE U 04099
HAGEMANN R 04003
HAGEMEYER R 04403
HAGENW 03714
HAHN K J 03878
HAIS, K 04469
HAJEK J 03665
HALIL T 04404

HALLIDAY E C 03941
HALLSTROM C H 04032
HAMADA M 04108
HAMAMURA, N 03938
HAMILTON J K 03991
HAMILTON T H 04100
HAMNER G P 03761
HAN, S T 03637
HANIG R C 04101
HANKE E 03587
HANNAN D G 03911
HANNAN D G 03907
HANSEN, G A 03566
HANSLIAN L 03588
HARA H 03932
HARADA, A 03953
HARDING J W 04102
HARDY H L 04438
HARGRAVE J H 04188
HARRIS N D 04103
HARTECK P 03973
HARTLER N 03982
HARTLER N 04104
HARTLER, N 03984
HARTREE E F 04105
HASCHE R L 03712
HASEGAWA Y 03781
HASEGAWA, Y 04223
HASELBARTH J E 04535
HAUCK, C T 04256
HAUL R A W 04106
HAVEN G T 04107
HAVEN M C 04107
HAVEN Y J F 03888
HAYAKAWA T 04108
HAYASHI I 03727
HAYDON B 04536
HAYHURST, A 04109
HAZEN T E 03898
HEINONEN A 04439
HEITMAN J B 04290
HELD A M 04357
HELLER H 04110
HENDRICKSON D L 03604
HENE W 04260
HENLEY D E 03879
HENNEMAN, J 04462
HENSEL R P 03842
HERBER H 03714
HERLES F 04370
HERMAN, B M 03954
HERMANN J 04348
HERZ W 04111
HEUMANN H 03803
HIGH C F 03715
HIGUCHI M 03716
HILFENHAUS J 04403
HILFENHAUS J 04402
HIMI, Y 03880
HIMMELBLAU D M 04112
HIMMELHOCH S R 04113
HINO Y 03717
HINO Y 03589
HINO, M 03955
HIRASHIMA M 04108
HIRSCHLER D A JR 03819
HOAG D S 03718
HOBBS, P V 03956
HOFFMAN G A 03719
HOFMANN K P 03881
HOLBROOK E A 03720
HOLLAND W W 04404
HOLLAND, R A B 04114
HOLLAND, C T 03667
HOLLANDER E 03721
HOLLANDER E 03590
HOLMA, B 03882
HOLMA, B 04405
HOLME A 04492
HOLMES J M 04115
HOPCROFT P C 04543
HORECKER B L 04066
HORN W 03883
HOUGEN A 04423
HOUGEN O A 04116
HOVEKE G F 04537
HRUTFIORD, B F 04186
HRUTFIORD B F 04117
HUEY W B 04382
HUGHES E R 04033
HUGHES, J M 04307
HUKUI S 04483
HUMPHREYS, K K 03667
HUNIGEN E 03946
HUNT A H 04359
HUPKA, E 04463
HURLEY, J H 04538
HURTUBISE F G 04264
HYATT E P 04118
HYNNE P H 04270

I

IAGOVKIN, A F 04464
IDEL CHIK I E 03722
IIDA C 04119
IINOYA K 03723
IMAI K 04321
INBAR M 04365
INDRIGO R 03724
INGIULLA M 03939
INGRAHAM T R 04342
INGRUBER O V 04347
INGRUBER O V 04346
INGRUBER O V 03838
INNES, W B 03725
IRAVANI J 04120
IRELAND, F E 03591
ITO M 03726
IWABUCHI K 03727
IZQUIERDO, M 03948

J

JAAG E 04005
JACOB S T 04121
JAFFE S 04122
JAMISON R M 03788
JAMISON, A 03592
JANSEN L 04123
JANSSON L B 03593
JASKULLA N 03946
JEFFERIS G C 03729
JEFFES J H E 04263
JENSEN W 04124
JENTZSCH D 03884
JEPHSON A C 03579
JESSNITZ W 03730
JEWELL D M 03731
JIRU P 04097
JOHAM H E 04125
JOHANSON M 04124
JOHNS P T 04218
JOHNSON E R 03628
JOHNSON W R 03626
JOHNSTON H S 04126
JOHNSTONE H F 04127
JOHSWICH F 03732
JOHSWICH F 03696
JOLLY A 03570
JONAKIN J 04484
JONES C R 04112
JONES J F 03594
JONES M M 04222
JONES M M 04221
JUGEL W 03841
JUNGREIS E 03885
JUNGREIS E 03886
JUSTUS E J 03595

K

KACHI, S 03940
KADLEC, B 04299
KADOI, M 04485
KAHANA L M 04406
KAINZ G 04128
KAMEI K 03702
KAMISHIMA, H 03967
KAMO R 03682
KANE F A JR 03733
KANE, J M 03596
KAPITONOVA L P 03668
KARASEK M A 04361
KARMARKAR, K H 03853
KARP I N 04129
KARR, M H 04540
KAUT V M 03980
KEALY R D 04130
KEANE, J R 03887
KEE M L 04001
KELLEHER W J 04268
KELLEY, J J JR 03957
KEMENY E 03941
KENAGA D L 04131
KENDREY G 04407
KENG E Y H 04012
KENKYUSHO K K 03735
KENNEDY E P 04281
KESLER R B 04132
KESLER, R B 03637
KETOV A N 04235
KETTLEWELL H B D 04466
KETTLEWELL H B D 04465
KHIBIN L S 04408
KHOBE R 03736
KIMURA N 03737
KINDLER W A 04131
KINNEY J A S 04443
KINNY H 04385
KINOSHITA S 04075
KINSEY J A 04133
KINSMAN, S 03597
KIREEV V I 04393
KIRK D G 04134
KIRKBY A H 03686
KIRKPATRICK W S 03751
KISHEN J 04053
KITA N 03738
KITAMURA H 04321
KITROSSKY N A 03871
KITSON G H J 03888
KJELLMAN B 04135
KJELLSTROM W A 04309
KLEIN F S 04122
KLEIN J J 04088
KLEINERT T N 04137
KLEINERT T N 04136
KLEINERT T N 04140
KLEINERT T N 04139
KLEINERT T N 04138
KLEINFELD M 04141
KLIMOV A P 04266
KLOESEL A 04403
KLUKEN N 04396
KLUN G 03724
KLUSHIN D N 04142
KNIEBES D V 03889
KNOP W 03739
KNOP, W 03598
KOCHETKOVA T A 04393
KOENER H J 03942
KOGARKO S M 03988
KOGLIN W 03740
KOHGO, T 04409
KOIKE M 04108
KOIZUMI M 04143
KONDRASHOV V A 04410
KONNO K 03741
KORNEYEV Y E 04411
KORTEMME H 04385
KORYTNYI E F 04162
KORZHINKOVA M 04085

KOSOBOKOVA E M 04162
KOTAKA S 04144
KOTT G L 03599
KOTZERKE D F 03600
KOUTNIK J 03742
KOVALENKO G V 04340
KOYAMA F 03727
KRAMARENKO, I B 04145
KRAMER C L 04228
KRANZ R 04146
KRATZ H 04171
KRAUSE U 03836
KREIMANN H H 03601
KRETSCHMER A 03656
KRIZ M 03743
KRUEGER A P 04144
KRUMIN P O 03602
KUBALEK J 03918
KUBITZA K H 03749
KUDSK, F N 04147
KUHNE K 03884
KULAKOV, A Y 04412
KULKA R G 04110
KUMASAKA, K 04320
KUND P 04343
KUNIN T I 04148
KUROIWA T 03603
KURTH E F 04158
KUZ MINYKH I N 04149

L

LAANE J 04150
LACEY R E 04195
LADAM A 03710
LAGARDE, E 04418
LAHMANN E 03891
LAHMANN E 03890
LAKSHMANAN M 04319
LAMB F W 03819
LAMB, F W 03709
LAMBIEV D 04196
LANG E W 04195
LANGER G 03892
LANGER, G 03893
LANGHOFF J 03744
LASSERRE P 03745
LASSITER J W 04151
LAVER M L 04152
LAWSON S D SR 03604
LAWTON B E 04183
LAYNE W R 04153
LAYNE W R 04433
LE BOUC F 04154
LEACH S J 04155
LEE G 03746
LEHLE W W 03747
LEITHE W 03605
LEITNER, M I 03748
LEJOHN H B 04156
LEMKE K 03749
LEMKE K D 03828
LENFANT, J 04157
LENZ B 04082
LENZ B J 04158
LEONARD J W 03842
LEONARD, J W 03750
LEONARD, J W 03667
LEOVY, C B 03959
LEPSOE R 03751
LEPSOE R 04159
LEVITT B P 03979
LEVY A 04191
LEWIS E C 04488
LEWIS W K 04161
LEWIS W K 04160
LEWIS, C J 03606
LEZOVIC J 04467
LHERMITTE, R M 03894
LI J B 04257
LIEGEOIS, F 04468
LIESEGANG D 03752
LIEVENS P 04413
LIPMANN F 04091
LIPPMANN, M 04364
LIPSHTEIN R A 04162
LITTAU V C 04244
LOBANOV Y A 04148
LODGE J P 04311
LODGE J P JR 03927
LOEBL E M 04163
LOKSHIN M A 04076
LOOS J 04507
LOOSLI C G 04372
LORAS V 03580
LORTIE, J 04164
LOWE J C 04152
LOWICKI N 03753
LUDWIG J H 04545
LUDWIG S 03754
LUK YANITSA A I 03703
LULLING J 04413
LUNG F L 04001
LUOMANMAKI K 04414
LURIA S M 04443
LUTZKE K 03583
LUY, P 04463
LYNESS W I 04061
LYUBIMOVA M N 04166
LYUBIMOVA M N 04165
LYUBLINA E I 04167

M

MACDONALD H E 03608
MACGREGOR R R 04168
MACHOLDA F 04370
MACKIW V N 04169
MACPHERSON P 04415
MACUCH P 04367
MAEKAWA T 03775
MAEKAWA T 03774

MAESSEN J G H 04179
MAGNUS A 04171
MAGNUS A 04170
MAGNUS A 04172
MAGNUS K 04423
MAGUIRE B A 03869
MAHLER H R 04168
MAINS, D L 03755
MAJOR, W D 03566
MAL TSEVA T G 04235
MALYSHEVA I N 04194
MAMON L I 04077
MANAKIN B A 04042
MANAKIN G A 03831
MANCHOT W 04173
MANDELIK B G 04174
MANDZHGALADZE R N 04416
MANNBRO N 04176
MANNBRO N 04175
MANNING D L 04177
MANTASHYAN A A 04078
MARCHOK A C 04178
MAREK C J 03682
MAREK M 04085
MARGOLIS F G 04355
MARIOTTINI E 03939
MARKARYAN D S 04416
MARKOV B L 03636
MARKVART M 03756
MARRACCINI L M 04140
MARRACCINI L M 04138
MARS P 04179
MARTENS, S W 03895
MARTIN C J 04360
MARTIN D A 04180
MARTIN I F 04024
MARTIN I F 04023
MARTON J 04181
MASEK V 03609
MASEK, J 04469
MASSON P L 04413
MASTIN T W 04508
MASTIN T W 03757
MATSUMOTO K 03759
MATSUMURA, N 03815
MATSUMURA H 03846
MATSUURA H 04337
MATTIA M M 03760
MATTOX W J 03761
MATZEL W 04343
MAURI C 04376
MAURI C 03574
MCADAMS H T 04182
MCCHESNEY E W 04429
MCCLENAHAN J B 04417
MCCONNAUGHEY P W 03896
MCCUNE D C 04496
MCDERMOT H L 04183
MCGEE W W 04184
MCGEE, J 03620
MCHATTIE, R H 03762
MCINTOSH D C 04185
MCKEAN, W T JR 04186
MCKENNA J M 04187
MCKERROW G C 03610
MCLAUGHLIN H E 04349
MCLEOD W 04486
MCLEOD W 04487
MCNALLY E T 04493
MCNAUGHTON R R 04188
MCQUIRE R C 03625
MCTAGGART, N G 03897
MEAD J 04424
MEANS A R 04100
MEAR J 04377
MEDALIA N Z 04518
MEERBURG A J 03930
MEERSSEMAN F 04413
MELA L 04189
MELLER A 04190
MENET, J P 04418
MENZANI, C 04452
MERIK J 03943
MERKEL J A 03898
MERRYMAN E L 04191
MERZ O 03899
MESSEN JASCHIN G 03763
MEYER F J 04131
MEZENTSEV A N 04087
MICHALEK, J 04299
MICHLINSKI W 03810
MIDDLETON, J T 04541
MILOVAN A S 04192
MILHAUD G 04459
MILLER E B 03764
MILLER F G 03765
MILLER S T 03996
MILLER S T 04230
MILLER, C A 03897
MILLER, E L 04069
MILLER, O 04069
MILLS H E 04542
MILLS R R 04193
MILLS W A 03915
MINAYEV A A 04400
MINER J R 03898
MINKH A A 04194
MINOT A S 04259
MINOURA, J 03766
MINTZ M S 04195
MIREV D 04196
MIRONNEAU, J 04157
MIRSKY A E 04244
MIRSKY A E 04243
MIRZOYEVA L M 04197
MISAKI M 03900
MISHCHENKO Y S 04149
MISHCHENKO Y S 04266
MISYUK E L 04042
MITCHELL D R 04198

MITCHELL C D 04543
MIURA T 04419
MIYAKE Y 03768
MIYOSHI, N 03815
MIZUTANI H 04143
MIZUTANI, M 04208
MOESE J R 04420
MOHAMED A H 04470
MOHAMMAD S 04053
MOHLER, S R 04383
MOHNEN V 03881
MOHRNHEIM A F 03611
MONAGHAN M T 04199
MOND A 03769
MONOMAKHOFF A 03902
MONSALUD M R 04200
MOOLTEN S E 04201
MOORE P B 04202
MORAWIETZ W 04203
MORGAN R S 04204
MORI T 03617
MORK T 04423
MORLA, R 03948
MORONEY, J R 03937
MORRISON, J L 03770
MORTON J D 04151
MUELLER E 04205
MUKHOPADHYAY A 04206
MUNARI S 03866
MUNRO H N 04121
MURAKAMI H 03771
MURAMATSU, F 03880
MURRAY J A 04207
MUSHA, S 04208
MUSSENDEN R 04417
MYERS J G 03660

N

NADINSKAYA O V 04142
NAGAI T 04229
NAGASAWA S 04209
NAGATA K 04210
NAGATA K 04143
NALBANDYAN A B 04078
NAROZNY, J 04471
NAUMOVA L A 03772
NAVARRE, A J 03566
NEIDER R F 03576
NELSON P F 03615
NENQUIN G 04500
NETSCHERT, B G 03773
NEUBERT D 04211
NEUMANN B 04212
NEUMANN B 04213
NEWNHAM, H A 03616
NICHOLLS P 04214
NICHOLLS P 04215
NICOLAS P M 04200
NIEF G 04003
NIKULINA V S 04004
NILSSON H E R 04216
NINOMIYA, J S 04344
NISHIZAWA Y 03774
NISHIZAWA Y 03775
NOBE K 04217
NORDBERG, G F 04369
NORDLIE 04218
NORSTEDT I 04219
NOSHKIN V E 03944
NOVOTNY P 03742
NUKADA A 03617
NUKADA, M 04208

O

O DONNELL H J 04310
O KEEFFE, A E 03920
O NEAL J D 04060
O NEAL J D 04267
O SULLIVAN W J 04220
O'REILLY, B 03776
OBERDISSE E 04211
OBERING E A 03777
OCHS H J 03778
OCHS H J 03779
OESTREICH C H 04221
OESTREICH C H 04222
OGATA M 03617
OGURA, Y 04472
OHLSEN J D 04417
OHNO I 03780
OHTSUKA T 03781
OHTSUKA, T 04223
OKAJIMA K 04029
OKANO, T 04208
OKOSHI O 03783
OKU K 04337
OKUDA I 03726
OLAF JOERN 03903
OLIVO R 03574
OLIVO R 04376
OLSSON J E 04224
OMAN E 03784
OMICHI K 03785
ONO, T 04223
OOMICHI S 03904
ORR C JR 04012
ORSLER R J 04225
ORTMAN, G C 03920
OSHIMA S 03775
OSHIMA S 03774
OSTBERG K 04216
OTTO J 03905
OVCHINNIKOVA Y N 04041
OVCHINNIKOVA E N 04043
OVCHINNIKOVA Y N 04226
OZKARAGOZ K 03945

P

PACKER L 04095
PACKMAN D F 04225

PADOVANI C 03787
PADOVANI, C 04510
PADUCHEV V V 04227
PADY S M 04228
PAGGI A 03908
PANZICA N J 03788
PAPASOVA M P 04229
PAPAVASILIOU P S 04230
PAPAVASILIOU P S 04033
PARRY V F 04231
PARTLOW E V 03991
PARTRIDGE H D 04232
PASHCHENKO V P 04421
PATE J B C3927
PATTEET L C45C0
PAULING H 03803
PAVLOVIC, R A 04473
PAWLIKOWSKI S 03789
PAZYNICH V M 04422
PEARCE, B 03897
PEARL D R 03824
PECENY R 04233
PECHKOVSKIY V V 04234
PECHKOVSKIY V V 04235
PECKHAM J R 04327
PEDERSEN E 04423
PEHLKE R D 04029
PENNEY G W 04363
PENNY G W C3790
PEPPER J M 04236
PERIN G C3619
PERREU, J 04237
PERRY, H C362C
PESKIN R L 04238
PETER S 03791
PETERS J M 04424
PETERS W 03744
PETERSON E A 04113
PETTERSSON S 04239
PEVNYY N I 04240
PHINNEY J A 04028
PIERCE J A 04241
PIERCE, J O 03851
PIGFORD R L C4127
PIS MENNAYA S D 04129
PITTS, J N JR 03906
PITTS, J N JR 04242
PLANTIER M C37C0
PLANTZ C A C3907
PLAVNIK G M 04050
PLUMLEY A L 04488
PODMOLIK J C3665
POGO A O C4244
POGO A O 04243
POLISHCHUK Y N 04042
POLITZER P 04245
POLMORAK O M C4C04
PONOMAREV Y L 04248
PONTREMOLI S 04066
POON, C P C 04246
POPE C G C4247
POPPIUS H 04439
POPYANKOV B 03829
PORTHOUSE J D 03862
POTEMKIN P S C3622
POTZL K 04425
POUR V C3756
POZIN M Y 04248
PRAHACS S 04249
PRAHACS S 03651
PRESCHER K 03891
PRESCOTT J M C4250
PRIDATCHENKOV V G 04235
PRIETSCH W C3946
PRIGNOT J C4413
PROSSER C L 04229
PUTZ L 04505

Q

QUIMBY G R 04251

R

RABSON S R 03793
RADAELLI A 03695
RADKE, L F 03956
RAFTER G W 04252
RALEK M 04097
RALL H T 03924
RAMA S 03909
RAMA S 03908
RAMAKRISHNA T V C4253
RANDHAWA, J R 03948
RAO, T S 03853
RAPSON W H 04232
RAPSON W H 04254
RAUSA G 03619
RAZUMOVSKII S D 04255
REALE F C3645
REDDING, R A 04256
REED, J I 04398
REES R L 03794
REESE J T C3790
REESE J T 04484
REEVES R R 03973
REHWOLDT R E 04257
REID J H C3624
REID W T 04258
REID W T 04215
REID W T 04214
REIMAN C K 04259
REINSCH I C4211
REITER R 03960
REITER R 03910
REMY H 04260
RENZONI L S 03625
REUSSER F 04261
REYSIG V A 04262
RICARD L P C3867
RICE G A 04484
RICHARDS J P 04103
RICHARDSON F D 04263

RICHERT F 03795
RICHMOND C R 04074
RICHTER J 03971
RICKARD E K 03601
RIES E D 04161
RIES E D 04160
RIOUX J P 04264
RIPLEY D L 04265
RIPPEL A 04367
RITMAN E L 04190
ROBB E W 03626
ROBERTS C C 03911
ROBERTSON A J B 04051
ROBINSON J W 03627
ROBINSON J W 04276
ROBINSON J W 04253
ROBINSON, E 03934
ROBSON S 03796
RODIONOV A I 04149
RODIONOV A I 04266
RODKEY F L 04267
RODKEY F L 04060
ROE F J C 04407
ROESNER G 04325
ROGERS R R 04486
ROGERS R R 04487
ROHDE W 04426
ROHRMAN F A 04545
ROJAS M S 04339
ROLFE, T J K 03683
ROLNICK L S 04207
ROMANENKO K Y 04334
ROMEO P L 03647
ROOT D F 04152
ROSAZZA J P 04268
ROSE H J 03797
ROSENBERG, E 04269
ROSENQVIST T 04270
ROSS L W 04271
ROSS R W 03578
ROSS S 04272
ROTH E 04003
ROTHE W 03798
ROZANTSEV E G 04255
ROZLOVSKIY A I 04273
RUB F 03799
RUBAY, M 04427
RUBAY, M 04428
RUBAY, M 04474
RUNDLE, H N 03951
RUNION T C 03628
RUNOLINNA U 04274
RUOF, C H 04344
RUSSELL J C 04429
RUUS A L 03800
RYAN D J 03676
RYAN K 03693
RYBNIKOV V I 04329
RYDHOLM S 03971

S

SACHDEV S L 04275
SACHDEV S L 04276
SACKS L E 04353
SADILOVA M S 04430
SAITO T 03629
SAJDEL E M 04121
SAKAI A 04337
SAMUELSON O 04219
SAMUELSON O 04224
SAMUELSON O 04239
SAMUELSON O 04123
SANDERSON R T 04277
SAPSE A T 04431
SARKANEN, K V 04186
SARKAR G G 04519
SARKAR M K 04519
SARTO J O 03801
SATO R 04513
SAUTER E 04171
SAVAS, E S 04514
SAWICKI, E 03912
SAWYERS, C H 03667
SAYFUTDINOV, M M 04432
SCHACKMANN H 04278
SCHADT, C F 03934
SCHAFER, L J 03573
SCHECK H F 03913
SCHEIDEL C 03802
SCHENCK R 04279
SCHINDLER S 03946
SCHMAHL N G 04280
SCHMID H 04173
SCHMIEDER M 04211
SCHMITT K 03803
SCHMITT W 04402
SCHNEIDER P B 04281
SCHONFELD E 04282
SCHOON N H 04283
SCHOTTKY W F 04284
SCHREIBER H 03914
SCHROEDER W 03714
SCHROEDER H A 04285
SCHROETER K 03804
SCHUETZE M 03805
SCHULZE H D 03947
SCHUSCHKE G 03947
SCHWARTING A E 04268
SCHWENK W 04480
SCRUTTON M C 04192
SEAL M S 03915
SEEMANN V 04286
SEERY D J 04287
SEGLIN L 03594
SEIDEL P 04391
SEKIKAWA, T 03806
SELIGMAN R B 03626
SELWAY J J 03807
SENSENBAUGH J D 03729
SERCARZ E E 04431
SERDYUK L S 04288

SERENIUS, F 04369
SERGEANT S V 04092
SEROVA L V 03970
SERPINSKIY V V 03993
SETZER D E 03916
SHAFIZADEH F 04152
SHAFNER H 04387
SHAPIRO A B 04255
SHATSKY, S 04364
SHAW A C 04289
SHAW J T 03858
SHCHEDROV M S 03668
SHCHEGOLEV G M 04262
SHEAHAN T J 04508
SHEAHAN T J 03757
SHEALEY, L D 03808
SHERA B L 04290
SHERMA J 04291
SHERWOOD T K 04022
SHIELS D O 04292
SHIELS D O 04294
SHIELS D O 04293
SHIGETA Y 03917
SIDDALL R G 04199
SIEDLEWSKI J 03811
SIEDLEWSKI J 03810
SIEDLEWSKI J 03809
SIEDLEWSKI J 03823
SIEDLEWSKI J 04297
SIEDLEWSKI J 04298
SIEDLEWSKI J 04296
SIEDLEWSKI J 04295
SILTANEN P 04439
SILVEY J K G 03879
SIMECEK J 03918
SIMECEK, A 04299
SIMONS W 03630
SIMONSON R 04300
SINCLAIR G D 04301
SINGHAL R K 03812
SITTENFIELD M 03813
SKEWES, L M 04344
SKYE E 04475
SLAVYANSKIY V T 04302
SLAYTER H S 04204
SLONIM N B 04546
SLUTSKY S 04303
SMELLIE R M S 04038
SMIRNOV V I 04329
SMITH C M 04198
SMITH G E 04206
SMITH R P 04153
SMITH R P 04433
SNOWDEN F C 03913
SOBECK H R 03814
SOBER H A 04113
SODA R 04305
SOLBRIG C W 03682
SOLOMON W R 04434
SOMLYO A P 04306
SOMLYO A V 04306
SOMOLYAI JOSEF 03903
SONODA, N 03815
SOO, S L 04307
SOROKA B S 04129
SOVA B 03919
SPECKMANN E W 04308
SPIEGELMAN, J R 04364
SPIRO T G 04309
SPRUNK G C 04310
SPURNY K 04311
SQUIRE W 04088
ST PIERRE G R 04312
STACIE, J H 03631
STADNIK S A 04262
STADTMAN E R 04358
STAHRE G 03657
STALTER N J 04065
STANESCU D C 04435
STAROSEL SKIY Y I 03831
STARR C 04520
STASSEN J 04500
STAUBING P 03816
STECK W 04236
STEENBERGEN S T 04313
STEIGERWALD B J 04545
STEIM, J M 04256
STEIN E 04141
STEIN, M 04256
STEINEGGER S 04436
STELLE, W W 03817
STEPHAN D G 03818
STEPHENS R E 03819
STEPHENS, R E 03709
STERNER J H 04437
STEVENS, D J 03937
STEVENS, R K 03920
STIRPE F 04314
STOBER W 04315
STOECKLE J D 04438
STOLOVITSKAYA M M 04316
STONE R W 04357
STONE W JR 04431
STOPPERKA K 04317
STRASCHILL M 03820
STRATMANN H 03696
STRAUSS H J 03821
STRICH E R 03828
STRIMBECK, D 03620
STUBBS R C 03889
STUDER, R 04476
STUIVER, M 03961
STUKEL J J 04307
STUMP J H JR 04349
SUBBA RAMU M C 04318
SUGDEN, T 04109
SULLIVAN T W 04130
SULLIVAN J L 03878
SULOCHANA C B 04319
SUSS G 04317

SUZUKI, S 04320
SVAJGL O 03822
SVECHNIKOVA A I 04401
SWAGER W L 04515
SWINARSKI A 03823
SYRDAL A 03693

T

TABACHNIKOV A G 04288
TADA O 03921
TADENA F G JR 04200
TAKAGI S F 04321
TAKAMURA Y 04143
TAKANARI N 03781
TAKEDA K 04322
TAKEMURA Y 03759
TAKENAKA T 04323
TAKEUCHI H 04321
TALA P 04439
TALDYKIN I A 03636
TALLENT R G 04488
TAMAGNO J 04303
TAMURA K 03932
TANAKA Y 03974
TANDY G H 04324
TANG L 04033
TANIOKA Y 03922
TANZMAN H D 03923
TARASOVA D V 04055
TARAT E Y 04248
TAYLOR D M 04125
TAYLOR D M 04359
TAYLOR H E 03824
TECULESCU D B 04435
TEICHMAN V 04370
TEITELBAUM P D 03632
TENG C S 04100
TERESHCHENKO L Y 04248
TERRILL J G JR 03915
TESKE, W 03633
THEMELIS N J 03746
THODE E F 04327
THOMA C 04479
THOMAS A P 04373
THOMAS A C 03858
THOMAS D G 03826
THOMPSON N S 04010
THOMPSON C J 03924
THOMPSON A P 04326
THOMPSON N S 04327
THOMPSON R B 04325
THOMSON A G 04489
THORNE S W 03969
THRUSH B A 04030
THURLOW G G 04328
THURSTON, K W 03895
TIEMAN J W 03827
TIKHONOV A I 04329
TIKHONOVA Z I 04330
TIPTON I H 04285
TITTERTON, E W 03937
TIX W 03828
TKACH N Z 04440
TKACH Y A 04331
TOGINO K 03925
TOLGSKAYA M S 04393
TOLLEY G 04490
TOPOROVA V V 04227
TOSHEV T G 03662
TRENDAFELOV D 03829
TRIACA W E 04332
TROBISCH, K 03830
TROUT P E 04333
TRUFFERT, L 04375
TSEYTLIN A N 04334
TSEYTLIN A N 03648
TSUTSUMI, S 03815
TUMA D J 03878

U

UBAYDULLAYEV, R 04441
UDEL NOVA T M 04335
UDY M J 04336
ULMER R C 03842
UMBRICHT E 03788
UNTERBERGER O G 03634
UTAKA G 04337
UYEHARA O 04338

V

VALENZUELA, P 03998
VALENZUELA, R 03948
VALLEE B L 04113
VAN GANSE W F 04424
VARLAMOV M L 03831
VASALLO C 04373
VASHAKIDZE V I 04416
VEDROS, N A 04547
VELDE H 04170
VERNER W C 04494
VIDELA H A 03977
VIEL G 04457
VILLAVICENCIO E J 04339
VIOLET P 03635
VISHNYAKOVA G P 04055
VIVOLI G 03574
VIVOLI G 04376
VLASOV A Y 04340
VLCEK J G 03832
VOHRA K G 04318
VOLKOV A D 04083
VORONOV F D 03636
VYDRA F 04341

W

WAGNER R P 04133
WAKABAYASHI T 03833
WALDOCK K T 04289

WALKER A O 03926
WALL, M R 03834
WALLIN N 04082
WALLIS E 03835
WAN, J K S 04242
WARD C C 03924
WARNER N A 04342
WARTBURG A F 03927
WASILEWSKA J 03836
WASSON P A 04548
WATSON K M 04338
WATSON K M 04116
WATTS A A 04503
WAURICK U 04343
WAYMAN M 04254
WEAVER, E E 04344
WEBER A L 04438
WEEKS E J 04345
WEGMAN L S 03837
WEINBERG E D 04313
WEINER B P 04442
WEITZMAN D O 04443
WELDON T H 04188
WELLER D L 04204
WELLER W 04120
WENZL H F J 03839
WENZL H F J 03838
WENZL H F J 04347
WENZL H F J 04346
WESSEL J 04348
WEST P W 04276
WEST P W 03886
WEST P W 04275
WEST P W 04253
WESTBROOK J J 03626
WHITLOCK C M JR 04444
WHITNEY, R P 03637
WHITON L V 04188
WHITTENBERGER J 04445
WICKE A F 04349
WIEDEMANN C R 03840
WIEDMANN L 03638
WIEMANN H J 03841
WIENKE K 03923
WIESSNER W 04080
WIKSTROM L L 04217
WILDER, H D 04350
WILHOUR, R 04477
WILKES S H 04250
WILLARD H H 04351
WILLIAMS A M 03929
WILMANNS I 03999
WILMORE J H 04352
WILSON E R 03842
WILSON, E B 03667
WILSON, E B 03750
WINDLE J J 04353
WINEFORDNER J D 04184
WINKLER E L 03604
WIPPERMANN F 04354
WISE C E 03843
WISE M B 04037
WISSE J A 03930
WOERNER F 03914
WOLF F 04317
WOLFF J A 04178
WOLFKOVICH S I 04355
WOLLMANN E F 03844
WONG, F F 04019
WOOD, F A 03639
WOOD, F A 04477
WOODFIN R O JR 04356
WOODHEAD R C 04493
WOODRIFF R 04357
WOODWARD M J 03640
WOOLFOLK C A 04358
WORTH R M 04442
WORWOOD M 04359
WOY H 03791
WRIGHT, F D 03641
WROTH W F 04517

Y

YAJIMA N 03925
YAMADA G 03642
YAMADA T 03845
YAMAGISHI S 04323
YAMAGUCHI S 04446
YAMAMOTO A 04483
YAMASHITA A 03931
YARGER, D N 03954
YARGER, H J 03566
YASUNAMI M 03846
YEAGER, D 03851
YEAGER, D 03573
YEH P S 04238
YEVICH J P 03731
YOCOM J E 04495
YOSHIMURA C 03932
YOSHIOKA N 03846
YOUNG A C 04360
YOUNG G J 04272
YOUNG S W 03847
YOUNG, T A JR 03848
YULDASHEV, T 04447

Z

ZACHER J 03849
ZAIKOV G E 04255
ZAPRYANOVA A 03829
ZARUBA F 04361
ZASORIN A P 03648
ZAWADZKI J 04362
ZBROZHEK L S 03831
ZEYDEL M 04309
ZIER M 03933
ZIESSE N G 04363
ZNAMENSKIY Y D 03668
ZOLOTAREV V S 03648
ZORE V A 04330
ZUALLAERT W 04500
ZUBOV V V 04248